THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. APRIL 2, 1896. CHICAGO, ILL. NUMBER 14.

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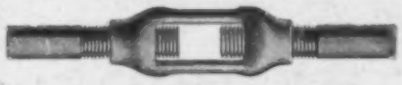

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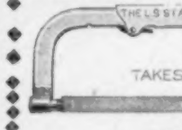

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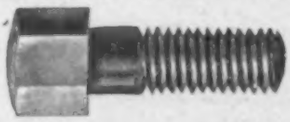

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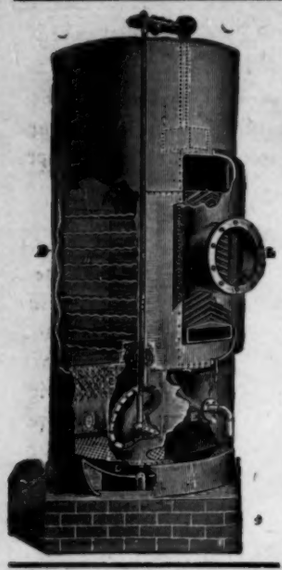

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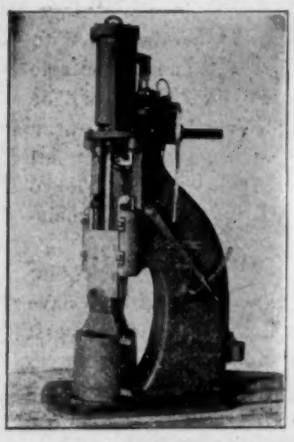

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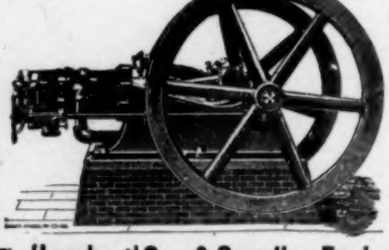

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THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. APRIL 2, 1896. CHICAGO, ILL. NUMBER 14.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Though buyers have not been entirely passive, the past week has been noteworthy in the main for activity among sellers—in the completion of arrangements to advance prices. Following closely on the announcement of the ore basis, three other movements of producers have been brought to a working stage. The steel billet pool, so strenuously worked for last summer, but without success, has been so far consummated in the past week as to establish a $20 Pittsburg price for April. Four important producers of Southern iron have come together in a selling agreement, and as an earnest of their purpose have announced Birmingham prices about 25 cents above the low figures of the past two weeks. Lastly, the Lake Superior charcoal furnaces have reached an understanding and fixed delivered prices on their product. Meantime makers of the various forms of finished material are finding some difficulty in deciding just where they fit into the increasingly complex price-making mechanism. For the present they seem more concerned about the volume and sources of demand than about the cost of their raw materials. There are a few signs, however, of a response to the general movement, from some lines of mill products. Plates have advanced, and there is a firmer feeling in structural material. Philadelphia notes a $2 advance in quotations on steel products by certain Eastern mills, in consequence of the marking up of billets. The events of the week have answered much of the late skepticism regarding an upward movement; it is yet to be demonstrated that putting a period to the decline will bring consumers into the market. At Pittsburg the effect of the definite fixing of Bessemer ore prices is seen in purchases of round lots of Bessemer pig, one large interest taking 40,000 tons, on which the price ranged from $12 to $12.25 Pittsburg. Since this purchase there has been considerable buying and the price has steadily advanced in the past few days, latest sales being at $12.75 in the valley, or $13.50 Pittsburg, an advance of $1.75 from the lowest point. The $20 price on billets has not brought any special activity as yet, in view of the quantities of steel sold at lower figures on which specifications have been lacking. No steel is sold by producers for delivery beyond May 1. The agreement among leading Southern furnace companies establishes a Birmingham price of $8 for No. 1 foundry, $7.50 for No. 2 foundry and No. 1 soft, $7.25 for No. 2 soft, $7 for No. 3 foundry, $6.65 for No. 4 and $6.50 for gray forge. This is not a great advance above the low mark established by the cut sales that led up to the new arrangement, and Northern producers of foundry iron are not meeting these prices. There is no change in the situation as to finished material. Pittsburg plate mills have gradually filled up under the demand for open-hearth material in the past two months and on May deliveries have advanced prices to 1.45c. Railroad work is not what had been expected. The requirements of the B. & O. receivers promise an attractive tonnage, however, on car and locomotive account. Some incentive has been given bar iron manufacturers to pull more strongly for the perfecting of their proposed pool, in view of the higher price for steel bars that is expected to follow the billet advance.

THE CLEVELAND DISTRICT.

No effort has been made as yet to sell ore for 1896 delivery. The stimulus given the Bessemer pig market in the week is not unwelcome to the ore interest at this juncture. Not that the price of ore as established can be affected by market changes; but any quickening in the pig iron market is apt to be reflected later in a broader ore buying movement after the big steel companies have taken hold. Something is expected to develop in the way of actual transactions before the month has progressed far. From present appearances less early contract tonnage will be negotiated this season than last year. Vesselmen regard the low water, of which there has been not a little talk recently, as an offset to the reduction of the Bessemer ore output. In the scaling of prices for hard ores this year, those that are crushed at the mine get a proper allowance for that betterment. Hard Bessemers that were scheduled at $3.30 and $3.35 last year will bring $4.55 and $4.60 this year, the advance being proportionately greater than the $1.10 increase on Norrie and Tilden. The proposition to establish an agreed basis of output and prices for non-Bessemer ores this year finds encouragement in the organization of Southern iron producers. With Southern foundry and forge irons kept on a profitable basis, Northern furnaces producing like grades will be better able to hold their trade. Nothing definite has been done as yet, but an advance of 50 cents a ton over last year's early price for non-Bessemer ores may be looked for. On some grades a greater advance may be maintained.

Pig Iron.

Valley furnacemen who have been holding for $13 for Bessemer iron at the furnace have found the market coming rapidly to their position the past week. After the Pittsburg sales of 40,000 to 50,000 in the latter part of last week, all of which iron came from local furnaces, offers were made to valley furnaces and some sales have been closed in the present week at prices ranging from $12 to $12.75 at valley furnace. At the latter figure several offers have been declined and negotiations are pending at $13, valley furnace, this figure having been refused in the past 24 hours. The cost of Bessemer iron to a valley furnace can scarcely be figured below $12.50, and with some will run from $12.75 to $13, with new ore; this fact, together with the basis maintained for billets makes it reasonable to look for a further advance. In foundry iron very little business has been done. Some sales of No. 1 are reported at $12, valley, or $12.75 Cleveland; and No. 2 is quoted at $12 Cleveland delivery. Southern No. 2 foundry can be delivered in Cleveland at $11.40 under the new basis for Southern irons. Little Northern forge is moving, but there is some inquiry in view of the withdrawal of the lowest Southern quotations. Lake Superior charcoal, with the understanding that now exists among producers, is delivered at Cleveland and Chicago at $13.50. Buffalo city delivery is $14, though a lower price is made on iron on dock.

Continued on page 7.

THE CHICAGO DISTRICT.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The principal news of the week is the report of the action taken by the Southern producers at their meeting held in New York, last week, and the rumors as to their action to be taken at the meeting in Birmingham, in the present week. All of the Alabama producers, and some from other Southern territory, were at the New York meeting, and it was decided that steps be taken to maintain the market by restricting production and making such prices as would insure a profit. It is thought that as a result of the meeting several Southern furnaces will be blown out, and that production by the various companies will be in proportion to their respective capacities. No action was taken at New York regarding prices, except that the current quotations were withdrawn, and it was decided that new prices would be made at the Birmingham meeting. Business in this territory has been quiet in the past week, and while the hopeful feeling among mill and furnace men continues, and it is thought that buying will be heavier within a short time, no sign of a heavy movement has appeared as yet. Sales of pig iron were small. In soft steel, nothing was done, as the local mills are waiting to see what effect the new prices on ore will have upon the market, and the development of the plans of the billet pool are also awaited. Structural material and plates were qniet, no large sales having been made. In sheets, a larger demand is noted, and it is thought that spring business will make the market considerably more active in the very near future.

PIG IRON.—The local market is in a waiting condition. Buyers are apparently afraid to supply their needs, as they fear prices will go lower. On the other hand the Southern producers, as noted above, have withdrawn their present quotations, and it is expected that prices to be made in the present week will be considerably higher than those given below. Local furnaces are maintaing prices firmly, and while they are not doing much business at the present time they are hoping that the action of the Southern producers will place the market for Northern irons in a better condition. Lake Superior charcoal iron is quiet, and while our quotations are unchanged the market is stiffer, and very little iron is sold at a price under our minimum figures. Quotations at present are as follows:

Lake Sup. Charcoal	$13 50@14 00	Southern No. 2 Soft	$11 10@11 35
Local Coke Fdy. No. 1	12 50@13 00	South'n Silveries No. 1	11 85@12 35
Local Coke Fdy. No. 2	12 00@12 50	South'n Silveries No. 2	11 60@11 85
Local Coke Fdy. No. 3	11 00@12 00	Jackson Co. Silveries	14 50@16 00
Local Scotch Fdy. No. 1	12 50@13 00	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2	12 00@12 50	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3	11 00@12 00	Ohio Strong Softeners	15 00@15 50
South'n Coke No. 1	11 85@12 35	Alabama Car Wheel	16 85@17 35
South'n Coke No. 2	11 35@11 60	Malleable Bessemer	13 00
South'n Coke No. 3	10 85@11 35	Coke Bessemer	13 00@14 00
Southern No. 1 Soft	11 35@11 60		

BARS.—No very large business was closed last week, and it is not expected the market will be in very much better condition in the immediate future. Several orders for round lots of car-iron have been placed recently and a fairly steady business is had from this source. General business has been quiet, no very large orders having been placed. Quotations are made at 1.20c to 1.30c for common iron, 1.25c to 1.35c for guaranteed, and 1.30c to 1.40c for soft steel bars from strictly billet stock.

RAILS AND TRACK SUPPLIES.—Local mills have closed a fairly good business in the last week, and have a considerable number of good orders in prospect. Quotations are as follows: Rails, $29; splice bars, 1.40c to 1.50c; track bolts with square nuts, 2c to 2.05c; hexagon nuts, 2.17½ to 2.25c; spikes, 1.75c to 1.80c.

BILLETS AND RODS.—The market is in an unsettled condition, owing to the fact that costs have not yet been figured out under the new prices of ore. The local steel company has refused to quote on several inquiries for soft steel, and will hardly be in position to make prices before the end of the present week. No sales of either billets or rods were made last week, and consequently we make no quotations at present.

STRUCTURAL MATERIAL.—Only a small business was done in structural shapes last week, and the inquiry for for future business is at present rather small. It is thought that within a short time heavy bridge work will be on the market and that building will increase in volume with the later season. Prices are unchanged, as follows: Beams and channels, 1.70c to 1.75c; angles, 1.55c to 1.60c; plates, 1.60c to 1.65c tees, 1.70c to 1.75c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—Business has been quiet but is satisfactory, as the local mills are not desirous of closing very much business at the present quotations. Prices are unchanged as follows: Tank steel, 1.60c to 1.65c; flange steel, 1.85c to 1.90c; fire-box steel 2.85c to 5c; boiler tubes, 70 to 75 per cent discount.

SHEETS.—A much better demand was had the first of the present week, and it is expected that buying will be considerably heavier than at present within 10 days or two weeks. Quotations are very irregular and range from 2.25c to 2.40c for No. 27 black and 80 and 5 per cent to 75 and 10 and 5 per cent discount for galvanized.

MERCHANT STEEL.—Local business was fair last week although no especially large orders were taken. Prices are unchanged as follows: Open-hearth spring, tire and machinery steel, 1.95c to 2.05c; smooth finished machinery steel, 1.70c to 1.75c; smooth finished tire 1.65c to 1.70c; tool steel, 5 50c to 7.50c; specials, 11c and upwards; Bessemer bars, 1.55c to 1.65c.

OLD RAILS AND WHEELS.—Old material has been in very little demand and no specially large sales were made last week. Prices are nominal at $13.25 to $14 for old wheels, $10 to $11 for old steel rails, and $14 for old iron rails.

SCRAP.—Business has been very light and is hardly expected to be much better in the immediate future. The following are buying quotations furnished by dealers: Railroad forge, $12 to $12.50; dealer's forge, $10.50 to $11; No. 1 mill, $7.50 to $8; railroad cast, gross ton, $9.50 to $10; machinery cast, $10 to $11; axles, $14.50; cast borings, $5; wrought turnings, $5.50; axle turnings, $6; mixed steel, $9; stove plates, $6.50; heavy melting steel, $10.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. Bessemer pig iron and steel billets have monopolized interest in this market the past week —the former on account of active business and advancing prices and the latter by reason of the completion of arrangements for agreed prices and production, by the leading producers of the country. Less than one week ago Bessemer pig sold at $12 and $12.25 Pittsburg; to-day it is quoted at $13.50, with $13.75, (or $13 at valley furnace) an immediate probability. The leading interest here bought 40,000 tons in the latter part of last week, nearly all from local furnaces at $12 to $12.25. Buying has continued, a number of dealers being in the market, and later lots were taken, some from valley furnaces, at prices equivalent to $13, $13.25 and $13.50, Pittsburg. The majority of valley furnacemen are holding to-day for $13 and some are reported to be unwilling to sell at that figure

for deliveries beyond May. The billet market has been put squarely at $20 by official announcement of companies composing the new pool, and this price is only for April deliveries, no sales being made of May or June steel. It is expected that a further announcement of prices will be made later in the month, for forward deliveries. Sales of steel made last week preceding the announcement of the $20 price on Friday ranged from $17.10 to $17.50 for April and May deliveries, quite a little changing hands. Plates have been the most promising article in finished lines the past week, an advance of $2 a ton having been made by some mills. We quote 1.35c to 1.45c. Open-hearth material has been much called for in the contracts placed since the opening of the year. The structural mills report good prospects for the coming three months, and while no large orders were booked in March there was a large amount of estimating to do. Beams and channels are quoted 1.45c to 1.50c, angles 1.25c to 1.35c, universal plates 1.35c, zees 1.45c. Present demand for bar iron and bar steel is chiefly of the small-lot order, and the absence of specifications on some of the business taken at higher prices is not a promising feature. Better prices for steel bars are anticipated in view of the $20 billet basis, and this may assist in holding prices on iron. We quote 1.10c to 1.20c as the range on common iron and on steel from billet stock. In pipes and tubes a fair business is done. The discounts given by jobbers are for black, 67 on lap weld and 57 on butt weld, and for galvanized, 55 on lap weld and 52 on butt weld. The mills give large buyers additional discounts of four 10s on lap weld and four 10s and 5 on butt weld, both black and galvanized, these being the discounts promulgated on March 18. A better inquiry is reported for sheets. For early delivery the basis is 2.10c to 2.20c for No. 27, and $1 to $2 a ton advance for deliveries beyond the middle of the year.

Cincinnati. The interest in iron transactions has been confined largely to the central territory during the past week. The East and West have not responded to the increased demand in this section. Purchases have been mostly in round lots, deliveries scattered as far ahead as furnace companies would accept. Buyers apparently realize that at the low prices quoted during the past 10 days iron is relatively cheaper than it was one year ago, when cost of production was much lower. For this reason they have deemed it wise to hedge against an advance. Some prominent foundries have followed the lead of the rolling mills, and there are still others interested in testing the market. Many profess indifference about the reported combinations of ore and iron men, but acknowledge that it is not probable production will be kept up under circumstances entailing a sure loss to the producers. Prices remain about the same. There are anxious sellers who are willing to cut to a limited extent for the sake of securing contracts from gilt-edge buyers. The reports from New York are more favorable regarding the financial situation; and the statements from the West in relation to crops are very encouraging. It is believed that the railroads will have sufficient business to keep up their earnings, and if this proves true, their long deferred buying movement may be witnessed this year. The attitude of many of the Northern furnaces has prevented their securing any of the current business. Those not supplied with ore cannot purchase at present prices and come out even. Others having stock purchased on last year's basis prefer to wait for the advance that seems to them inevitable and realize a profit later in the season. Collections continue fairly good. There are some requests for extensions and renewals, but the aggregate amount is not surprisingly large.

St. Louis. The buying movement which started in the Eastern markets has spread westward, and although orders are not as large as in other markets, a satisfactory tonnage is rolling up. Competition for the large business has brought prices of Southern iron down to a very low basis, so low that there is certainly not much profit to the manufacturer, and many consumers know that these conditions cannot continue indefinitely and are taking advantage of the situation. Consumption of pig iron in the Western market is probably a little in excess of the consumption this time last year.

Buffalo. Except for a little "spurt" in Southern iron, the local market has been uneventful. These transactions have been effected by close prices. As the season advances, the consumption of pig iron in this section seems to increase, and there exists a general impression that the volume will be good whether prices are as satisfactory or not.

A Premium for the Best Foundry Labor.

A certain foundry company in the Northwest has solved the wage problem to its own satisfaction. The necessity for establishing a stable basis arose when a strike appeared imminent about three years ago. The company had been paying union wages at the rate of $2.75 a day to its poorest molders, and had made a practice of voluntarily raising the wages of such men as the manager thought entitled to it 25 cents to 50 cents more. When the hard times came wages had to be reduced, and as the minimum union wage was $2.75, those drawing that amount could not be cut, and the best men in the shop, consequently, had to suffer, their pay being cut to a uniform level of $2.75 a day. For a time this worked well enough; but finally, those who had formerly been paid $3 and $3.25, and earned it, decided that they would strike for a resumption of those wages. A committee was delegated to wait upon the manager of the company, the spokesman of the committee being also the leader of the local union.

When the men had stated their request, the manager said that he could not afford to pay them more money, unless the union would be willing to reduce the minimum wages to $2.50, taking 25 cents off the poorest molders' wages, and this 25 cents the manager promised to add to the pay of the better men, as far as it would go. After considerable deliberation on the part of the union, the men decided to adopt this plan, and it has been in effect in that foundry ever since. The result has been that the less efficient molders, seeing better workmen drawing better pay, have an incentive to work harder and earn more, and the work the men in the foundry turn out under this plan is, consequently, much better than any it was able to do before. Each man strives to make himself equal to the best man in the foundry, so as to earn the highest wages paid.

German Furnace Practice.

The German blast furnaces generally range from 65 feet to 75 feet in height, and produce 650 tons to 850 tons per week. It is the tendency of the present time to steadily increase the pressure and the temperature of the blast and to add to the blowing engine and stove power. At some of the leading works each blast furnace has its own blowing engine, the pressure of blast varying from 11.8 inches to 17.7 inches. The German works, of course, produce a much larger quantity of basic iron than our own—one-half of the whole out-put being of this description. The slag made at these furnaces is granulated and sold as slag, or in the form of basic bricks. All the German basic Bessemer steel works have separate departments for the special treatment of the converter slags.—[London Iron and Coal Trades Review.

THE dates of the St. Louis meeting of the American Society of Mechanical Engineers, as officially announced, are May 19 to 22.

THE IRON TRADE REVIEW

DEVOTED TO

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MORE PRICE AGREEMENTS.

When the slight advances in the prices of Bessemer ore and Connellsville coke were made, a year ago, a demurrer was occasionally heard in the suggestion that an advance in prices of raw materials should come as the result of expanding demand for finished products. But the course of iron and steel markets in the few months following these advances proved that at that particular juncture the initiative very properly came from the two great primary interests that took it. While the situation to-day differs in many particulars from that of one year ago, there is this similarity—that the effort to stimulate demand by advancing the prices of primary products is being repeated. The advance on coke, which was much more radical than that of 1895, was made three months earlier than last year, and the ore advance is more radical; yet the method is that of 1895. It is to be noted, further, that the movement this time is a larger one than that of last year. The week just past has added to coke and ore, Southern pig iron, Bessemer steel billets and Lake Superior charcoal iron, as products on which prices are to be maintained by the strength of organization, or, as in the case of coke, by control of the bulk of the product.

The action of Southern furnace firms taken at New York last week is to be carried out into greater detail at a Birmingham meeting this week. The first result of the agreement has been an advance of from 25 to 35 cents a ton from the slaughtering prices of the past fortnight. On gray forge, if reports are correct, the $6.50 Birmingham price just fixed represents a 50 cent advance over some of the losing business lately done. The Tennessee Coal, Iron & Railroad Co. and the Sloss Iron & Steel Co. have at times in the past 12 months maintained agreed prices, but the Pioneer Mining & Mfg. Co. and the Woodward Iron Co. are now for the first time committed to the agreement, which has been strengthened by provision for the reporting of all sales to a commissioner. It is understood that each company will maintain its own selling organization, as heretofore. No restriction of production has resulted as yet, but steps in that direction are provided for, if thought advisable. The prices now ruling date from April 1 and are subject to action at any time. It need hardly be said that producers of Northern foundry irons are interested in this movement, and that further advances by the Southern combination will be welcome to furnaces paying $2 for coke and certain to pay an advance, yet undetermined, for this year's ore.

The reported pool on soft steel is far from being the "trust with $300,000,000 capital," which some of the dispatches have made it, but it is true that enough has come of the conferences which are still on in the East, to establish a $20 basis for Bessemer billets, Pittsburg and Wheeling, on April deliveries. There are details on which the heads of the leading steel companies are still at work. It is believed, however, that the question on which there was hopeless disagreement last summer, namely, the proposed elimination of all steel carried through to finished product in the mills of producers, is on the way to settlement. The meeting now in session in New York will be occupied chiefly with the question of tonnage, and how much of a concession must be made in order to bring in the two important concerns insisting on an apportionment based on their entire output of steel products, is yet to be developed. It need hardly be said that the bar iron manufacturers would find fresh stimulus to the completion of their proposed pooling arrangement, in the success of the plans of the billet mills. Higher billets mean higher steel bars, and with the competition of the latter relaxed the iron mills would find much less trouble in maintaining prices.

The third of the movements which have become effective in the week is that among the producers of Lake Superior charcoal iron. The wonder is, considering the slight tonnage involved and the absence of entanglements with other interests, that such an effort should have been so long coming, in view of the plight of the charcoal iron industry in recent years. The plan agreed upon provides delivery prices on Lake Superior charcoal iron at the various malleable and car wheel works supplied by upper lake furnaces. The prices announced the past week—a $13.50 Cleveland basis—represent no radical advance, and with malleable Bessemer from coke furnaces sure to be higher when new ores come into use, a higher price for charcoal iron is to be expected in the near future.

How far these efforts to move the market by working at the base will succeed, is yet to be demonstrated. Higher raw materials will be followed ultimately by higher finished products. Last year, when buyers were convinced by the ore and coke advances that the foot of the hill had been reached and an upgrade was ahead, they went into the market to cover. This movement became contagious, and, with even step, demand and prices grew together. The double movement advanced to a point at which purchases were made for wants well along in the fnture. It is quite certain that the effort of the country to catch up with itself—to use up what was bought last year at prices much above those of to-day—is the explanation of the wait of the past four or five months in the iron trade. Some of the contracts made last year are yet to be specified on, and to that extent are a shadow on the situation. And it is just because of some of these features of last year's experience that a pell-mell rush of buyers to cover before further advances are made, may not be seen in the near future.

It is not to be expected that the iron trade can be lifted into good business by exertions from within. General conditions will largely govern. New enterprises are important elements, and these depend much on monetary considerations. Last year the iron industry had a few

months of exceptional prosperity, in which other industries did not participate. And that may prove to be one reason why a similar individual movement cannot be executed in 1896. If this turns out to be a good year for business, the "good" will be of the all-together order, growing out of conditions of general operation. If the year's total is not what some have anticipated, there will be even more reason, perhaps, for satisfaction with the work of those interests in the trade that have provided against the losses resulting from heavy producing capacity and light demand.

THE CLEVELAND DISTRICT.—Continued from page 3.

Finished Material.

The local market for mill products has not responded thus far to the movements in crude materials, with the exception of plates, on which 1.45c Pittsburg is being asked by some mills whose order books are quite full, on open-hearth material. Some inquiry seems to have resulted from the higher price established for billets, though so far as the Cleveland market is concerned there is no activity in steel. Structural material has fair promise, the steel for two local buildings having been contracted for in the past week, with other work just ahead. The Wheeling & Lake Erie has bought 1,000 tons of rails and 1,000 cars and is figuring on considerable bridge work. Apart from this bridge requirements are light for the immediate future. On beams and channels the quotation is still 1.54c Cleveland; on universal plates, 1.44c. Bar iron and bar steel are dull, though the price of the latter is somewhat firmer with billets at $20. Tne old material market continues quiet. We quote No. 1 wrought scrap at $12.50; busheling scrap, iron and steel, $11.50; old iron rails, $15.50.

A Great Retort Coke Plant.

Further announcement is made this week concerning a project referred to in our industrial news columns on another page. The tract of land at McKeesport, Pa., for which negotiations have been going on recently, presumably by industrial interests, has been bought. John F. Wilcox, manager of the Otto Coke & Chemical Co., Pittsburg, has concluded the deal. The tract contains 20 acres and about 100 dwellings now occupied stand on a portion of it. It is close to the National Tube Works Co.'s plant and the latter is an important factor in the new project. The Union Gas Co., of Philadelphia, is to build on this land an immense plant of by-product coke ovens of the Otto-Hoffman type. The National Tube Works Co. will use the gas produced in coking, and it is expected that the plant will produce 400,000 cubic feet a day. The entire enterprise involves an investment of close to $1,000,000.

New Manual Training School at Muskegon, Mich.

A new manual training school is to be built at Muskegon, Mich., donated to that city by C. H. Hackley, who has already given Muskegon a public library building. The new building is to be built under the plans of Patton & Fisher, Chicago architects. It is to be used in connection with the high school, the students pursuing certain branches of study in the high school, and taking only the manual training in the new building. For this reason the plans for the training school provide for only a few classrooms at the front, the rest of the building being devoted to shops. The idea of the shop is carried out in the architecture, there being no plastering. The walls are all of brick finish on the inside and the floors of mill construction, the heavy timbers being dressed, forming both ceiling and floor. In the basement are the blacksmith and machine shops, and in the rear there is a separate building containing the engine, boiler-room and foundry. The first floor has the carpenter shop and wood-turning room. The second floor is entirely devoted to the girls' departments, there being a kitchen, laundry and sewing-room, with provisions for other branches of instruction. The space in the front is utilized for drawing-rooms and a large girls' gymnasium. At present only the center portion of the structure will be erected, at a cost of about $30,000. A very complete system of heating and ventilation by the hot-air blast system will be provided.

Personal.

Lindon W. Bates, the Chicago dredging and excavating contractor, Monadnock block, was slightly injured in a collision which occurred on the Pennsylvania near the Union station at Baltimore, March 25.

S. H. Holley, of the Lake Shore Iron Works, Marquette, Mich., called at the Chicago office of *The Iron Trade Review* last week.

Wm. Perry, of Pittsburg, formerly of Montreal, is the new manager of the Sharon Iron Works, Sharon, Pa.

Chas. Davis, of Cincinnati, represented the Manufacturers' Club of that city, before a legislative committee at Columbus, advocating the amendment of the Rawling's bill, now upon Ohio's statute books. The manufacturers claim that as at present the law represents triple taxation in that it taxes first the raw material; second, the stock in process of manufacture, and third, the finished stock. They want an amendment that will tax the monthly average value of the raw material, with the labor added.

THE city government of Cleveland has been exercised more or less in the past two months over the existence of an alleged water pipe combine. In February, when bids for 6,000 tons of pipe were opened, that of the Lake Shore Foundry Co., of Cleveland, at $21.90, was found to be the lowest. But it was so much higher than last year's prices that a re-advertisement was urged by certain city officials. After several weeks of discussion and investigation new bids were called for. These were opened on March 27, and showed the following range of prices: Shields & Lauer, (Cleveland contractors) $18.15 per ton, free on board, $18.25 delivered on the streets; Lake Shore Foundry Co., $19.30 and $19.90 respectively; the Peninsular Car Co., Detroit, $20.60; the Buffalo Castings Co., Buffalo, $21; R. D. Wood & Co., Philadelphia, $21.20; McNeal Pipe & Foundry Co., Burlington, N. J., $21.91; Addyston Pipe & Steel Co., Cincinnati, $22. The bid of Shields & Lauer is the lowest and it has been recommended to the council that a contract be made with them.

THE Technical Club of Chicago has leased the three upper floors of the old National Hotel building at 228 and 230 Clark st., Chicago, for ten years from May 1. The building will be modernized by the addition of an elevator and steam-heating apparatus; the roof will be so arranged as to provide the the members with a summer dining room and garden, which will be covered with an awning, and there will be an assembly room for technical societies on the second floor. It is thought the new rooms of the club will be ready for occupancy by July 1. The Technical Club, though a young organization, now has 150 resident and 50 non-resident members, among whom are some of the leading practical scientific men of the country.

THE steel schooner George E. Hartnell was launched by the Chicago Shipbuilding Co., at South Chicago, March 28. The new boat is 352 feet keel, 366 feet over all, 44 feet beam and 26 depth of hold. She is owned by the Northwestern Transportation Co., of Detroit, the principal stockholders of which are H. H. Brown, of Cleveland, E. M. Peck and L. C. Waldo, of Detroit. On 14½ feet of water, the present limit of draft to Lake Superior, the new boat will carry 4,000 tons, but on the completion of the 20-foot channel next year she will carry 6,000 gross tons at a trip.

THE Wilkes rolling mill at Sharon, Pa., has resumed operations after several months' idleness, giving employment to 100 men.

THE mills of the Akron (O.) Iron & Steel Co. have been run quite steadily under the present management, and have not missed a turn since the beginning of the year.

DETERMINING THE VALUE OF AN IRON MINE.

Dr. Nelson P. Hulst, known throughout the Lake Superior region as one well qualified to write upon any phase of iron mining problems that arise in connection with the ores of that region, has an article in the April *Engineering Magazine* on "Determining the Value of an Iron Mine." At the outset he says that judgment of the value of a mine must sometimes be without regard to its existing management and also apart from its books of account. The system of accounts must be thoroughly investigated to know on what basis inventory is made up, since machinery may be carried at close to its original value, when as a matter of fact it is becoming obsolete and may need soon to be replaced altogether. Then, again, there may be the unfortunate combination of a valuable mine and a poor manager, under which the mine may have shown a debt-producing capacity not fairly chargeable to it. The main factors affecting the value of a mine, as enumerated by the writer are: Magnitude of the ore body; accessibility to a point of consumption; market value of the ore; its chemical and physical qualities; freedom of the ore body from rock masses, as well as from lean or less merchantable ores; local relations affecting the mine; amount of water to be dealt with; timber supply. The latter half of the article has several references to developments of the past few years in Lake Superior ores and we quote at some length from it below:

The market price of iron ore necessarily affects the value of the mine producing it. For many years it has suffered frequent fluctuations in response to the ever-varying prices of iron and steel. This factor of market price of the ore, which determines the possible profits of mining and therefore the value of the mine, must be, not to-day's price per ton, or last year's, but the average price, as near as it may be ascertained, for such a period of time as may be judged to cover the profitable activity of the mine. The drift of business is to lower profits as individual enterprises grow larger. Within the past two years the market price of Lake Superior ores has sounded the lowest depths ever reached by them—a price which meant dire loss to many mines. The price for this year may show a rebound of a dollar per ton, but this does not mean that such increase is all profit to the mine operator. Increased wages and increase of freights, as well as increased cost of supplies, make up a portion of the difference in price. To be able to compute with any degree of correctness the average price of iron ore for a period covered by the future, one must needs be a seer. But one can, without assuming such a *rôle*, read the signs of the times as indicating in all directions a trend to lower prices. It is a natural inference that the profits per ton in mining iron ore in the Lake Superior region are also likely to tend to a lower figure, especially when one observes that its most promising mining properties —*i. e.*, the mines now producing, and others likely to produce, the major portion of the ore—are becoming absorbed into the control of a few corporations. As these corporations have diminished in number, the mines which they control, where capable of it, have been pushed to an increased annual output. A single mine in 1892, the Norrie of the Gogebic range, produced 985,000 tons of ore, while but 20 years earlier, all the active mines of the Lake Superior region, 29 in number, produced but 949,000 tons.

As showing how mines are beginning to be pushed for large annual output, it may be stated that for the year 1895 12 mines in this region produced a total of 5,200,000 tons, or half the entire production, and some of these giants are just gathering their strength. It may not be safe to say for a decade hence that the product of less than 12 mines will constitute the major portion of the annual iron ore output of the region, but it seems entirely within bounds to make the affirmation that a very considerably less number than 12 corporations will control mines which will produce the major portion of it. It is still more reasonable to expect that this production of the major portion will be accomplished with greater economy of cost per ton than at present, and that a less profit per ton will satisfy; and this appears the more reasonable when it is considered that these fewer corporations will have other profits coming to them from the transportation of the ore, if not also from its conversion into metal. Other reasons could be recited, but they cannot be included in so brief a paper. A figure, therefore, which might be expected to represent the average profits on iron ore to be used as a factor in valuing an iron mine should, since it must depend entirely on future prices, be made a comparatively small one to insure a safe investment. But the valuation of a mine sometimes includes the fee of the property. In such instance the risk in the business is wholly on the part of the investor. When, on the other hand, the valuation is to be of the leasehold and improvements, if any, together with a bonus large or small, as the case may be, the risk is diminished, for the reason that the fee-owner shares with the mine operator in a part of the hazard attaching to a mining investment. For a valuation in the latter case, it is enough to determine whether there is a sufficient quantity of ore in the mine, as well as whether there is the certainty of an ample average profit from it which will more than make good to the lessee his expenditure for the lease and for such equipment as it may require.

The chemical quality of an iron ore is an important factor in determining its value, and in consequence that of the mine producing it, since iron smelting has attained to the dignity of a science by the precision of its work. The capable furnace manager of to-day either is an intelligent chemist or has at his command a chemical laboratory staff. Iron smelting is conducted by him with all the exactness of a laboratory experiment, so far as ores, fluxes and fuels are concerned. To this end he must have an accurate knowledge of the various percentages of all the elements contained in an iron ore which will affect the quality of pig iron, as well as the slag-making constituents the ore contains. The higher the percentage of iron contained, the greater is its smelting value, except as it is limited by the character of the oxidation of the metal in the ore, it making a difference whether the metal exists in the form of a magnetic oxide or a sesquioxid. Phosphorus must be limited to a certain small percentage, varying with the use to which the pig iron is to be put. Sulphur is never admissible except in small percentages, unless it can be economically eliminated before reaching the furnace. The percentage of slag-making constituents of an ore affects fuel consumption and in so far as they enhance the freight on the units of iron contained in the ore, affects also the value

The physical quality of the ore, so far as it affects the cost of smelting, affects its market value. A score of years ago it was almost a necessity that the operator of a mine producing soft hematite ore should have control also of a mine producing hard specular ore or magnetic ore, whereby he might be enabled to compel purchasers of the much-sought-after hard ores to accept with them from 10 to 15 per cent of the much less desirable soft ores. A revolution has taken place in the ideas of blast furnace managers as to the comparative value of hard and soft ores. Costly plants of crushing machinery have been installed at several of the largest hard-ore mines, mainly that their product may be made thereby to approach more nearly the desirable quality of easy reductibility possessed by the soft ores.

The writer quotes with justifiable pride from a pamphlet he wrote in 1875 presenting the claims of the soft ore bodies of the then undeveloped Menominee range, to show his early conception of the relative values of the hard and soft ores of the Lake Superior region as affected by the cost of smelting them. "I call your attention particularly to the texture and quality of the samples of ore sent you. The distinctive feature of their open porous condition characterizes them advantageously as wholly unlike the hard ores of the Marquette district. They, as you know, are dense, close-grained in texture, and to such a degree impermeable to the reducing gases of the furnace that they are smelted with difficulty. Especially is this the case with magnetic ores. So, too, the friability of these Menominee (soft) ores, which renders mining easy and economical in all its details, and reduces expense upon them even to the last preparation of the ore suitably sized for charging into the furnace, accords a value to them not possessed by the hard ores mentioned."

The hardness of the ore produced by a mine affects materially the cost of mining it. Drill work becomes greatly more expensive as the ore grows harder. Not only does the labor cost of drilling, per foot, increase, but more power drills, more drill steel, more blacksmith and machine shop labor,

more explosives, and more waste of time by powder gases, are found necessary to produce a given tonnage of hard ore than are required to produce an equal amount of soft ore. The ore broken by blasting comes down often in masses requiring block-holing and sledging before it can be loaded on cars, and much of it must be lifted into cars by hand rather than by shovel, all of which adds to the expense of mining; and then follows the final cost of crushing, before referred to. The expense of timber and timbering may be at a minimum in a hard ore mine, but this economy is far outweighed by the economies attending the mining of soft ore.

The freedom of an ore body from rock masses and lean ore permits the application of the maximum of labor on the product sought. Not only is the mine labor more effective, because not wasted on useless material, but the straight-ahead work allows a systematization of it which insures the highest economy. Where rock masses occur, their avoidance, or their penetration in the prosecution of the so-called "dead work" is always a cause of much extra expense, while fragments of rock broken down with the ore vitiate its quality, if not picked out, and, if picked out, put a higher labor cost on the ore.

The local relations of a mine have an influence in affecting the cost of mining its product. When it lies close to the surface, or has a considerable portion of its tonnage situated so that it can be readily removed by open pit mining, the inexpensiveness of that system helps to a greater profit on the ore produced. The pumping cost is also at a minimum; or natural drainage may be possible. Local conditions affecting the cost of the installation of the surface equipment, and in a greater or less degree the cost per ton of ore, climatic conditions, and quality of labor all affect cost of production.

The water to be handled from a mine is more often than not a constantly increasing expense. Its volume may not grow larger as mining work extends downward, but the increased lift of a smaller volume may more than counterbalance the expense of handling it. In a region where a limestone formation overlies an ore formation, one may expect increased volume of water as depth is gained; for limestone, because of its ready solubility, is the home of subterranean water courses of great length and magnitude. The caving due to the mining of ore bodies so located is likely to open up connections with the water courses of the limestone, and this water, once tapped, is always on draught.

The timber supply necessarily is a larger item with a soft ore mine, as its levels, winzes, ore chutes, drifts and cross-cuts need artificial support. Some methods of mining soft ore involve the use of less timber than others, but with the least expensive the cost is, in the aggregate, a considerable sum.

From the foregoing it is seen that the determination of the value of an iron mine is a many-sided problem. It involves, among other things, questions of business, of mining, of engineering, of chemistry. Only intelligent and conscientious effort can estimate the value of the different factors with any degree of accuracy. The questions to be solved require a thoroughly reliable, capable man—one who is up-to-date in mining practice. He should be thoroughly conversant with the market value of iron ores and familiar with their chemical qualities. He should have a clear conception of the ways in which economies, big and little, are obtained in mining—a conception which has been disciplined by successful superintendence of an iron mine, as well as by the studies of its cost-sheets. He should have wrought over the problems of the opening of iron mines and the adaptation and installation of mine equipments. Only a man thus qualified can be expected to furnish a reliable estimate of the value of an iron mine, or of the cost of opening and equipping it.

These considerations have application, directly or indirectly, to iron mines wherever located. Judgments of iron mine values must be based on the underlying principles noted, which have universal application to this species of property.

Application of Blast Furnace Gases to Gas Engines.

It has long been recognized, says Prof. W. H. Walkinson, in a note read before the West of Scotland Iron and Steel Institute, that the present method of utilizing the gases from blast furnaces is a most wasteful one. The gases available, after the removal of tar, ammonia, etc., are practically non-luminous, and it is well known that on this account the boilers fired with them are exceedingly inefficient, owing to the fact that the amount of heat radiated from a non-luminous flame is almost nil. It is probable that the efficiency of boilers thus fired is not greater than 40 per cent; and if we assume that the efficiency of the steam engine, after allowing for losses in the steam pipes, is 12 per cent, the combined efficiency of the plant is only 48 per cent. The non-luminosity of the flame, while a great disadvantage in connection with steam boilers, is a distinct advantage when the gases are used in gas engines. If it were possible to obtain non-luminous flame at the pressures which obtain in gas engines, one of the greatest sources of loss in these engines—viz.: loss to the water in the jacket—would be much reduced. If these gases were used in gas engines of the present type, from 20 to 25 per cent of the heat of the combustion would be converted into work, as against about five per cent with the present system. Some time ago the author inquired of the principal makers of gas engines as to whether blast furnace gases could be used in their engines, and he was informed that the gas was too weak for gas engine purposes. Shortly afterwards he designed a new type of gas engine, which is especially suitable for use with poor gas, and he had hoped to be able to describe this fully in the present paper, but as it has not yet been tested he deems it better not to describe it at present. Some time ago the author received from Mr. B. H. Thwaite copies of indicator diagrams taken from an Otto gas engine working with gas made synthetically like blast furnace gas. Mr. Thwaite's experiments show that there is now no necessity to wait for a new type of engine, as the ordinary gas engines may be successfully used. The great possibilities in connection with the much more efficient utilization of the gases, especially if—as we may reasonably expect—the efficiency of the gas engine be raised to 50 per cent or 60 per cent, renders this branch of engineering of the greatest interest to these engaged in the manufacture of iron; and if this short note leads to a discussion on the subject, much good may result.

B. & O. Car and Locomotive Buying.

Receivers Murray and Cowen, of the B. & O. Railroad, have laid plans for the betterment of the equipment of the system that will be no small factor in railroad demands upon the iron trade in the near future, and Receiver Murray is thus quoted:

"We have given orders for every shop on the line under our jurisdiction to be operated on full time at repair work alone. It is our intention to overhaul and repair every locomotive and car that will justify the outlay. This will necessitate the employment of our entire force. Consequently, all orders for new locomotives and cars will be given to outside concerns. It is true that the Baltimore & Ohio system has not enough rolling stock to properly handle its business, and the necessity for more is imperative, although much of that which we now have out of repair can be made serviceable in our own shops.

"We intend ordering 5,000 freight cars as soon as possible, and also about 75 locomotives. Of the freight cars a large proportion will be coal cars, which may indicate the importance with which we regard our coal trade. The remainder will be box cars for miscellaneous freight. Of the locomotives, a small number, 12 or 15, will be for passenger service, as our locomotives in this respect are, as a rule, of a high standard. The balance will be for hauling freight. This rolling stock is for the Baltimore & Ohio proper, over which our receivership extends."

Michigan's Charcoal Furnaces in 1895.

Only seven out of Michigan's 15 charcoal furnaces were in blast any portion of the year 1895. The output and the time each was in blast are indicated below:

Name and location.	No. of months in blast.	Product.
Antrim Iron Co., Mancelona	8¼	21,627
Elk Rapids Iron Co., Elk Rapids	4⅔	10,097
Excelsior Fur. Co., Ishpeming	7	11,407
Gaylord Iron Co., Detroit	3	2,783
Peninsula Iron Co., Detroit	12	11,080
Spring Lake Iron Co., Fruitfort	12	25,015
Union Iron Co., Detroit	5¼	6,685
Total gross tons		88,700

HIRAM S. MAXIM is writing a series of important illustrated articles on the evolution and manufacture of automatic firing guns, the first of which appears in the current issue of London *Industries and Iron*.

LAKE SUPERIOR IRON MINES.

It is expected that the Queen mine at Negaunee, Mich., will start again this week. A reduction of the royalty on the better grade non-Bessemer ores to 25 cents has been agreed upon, and there only remains the adjustment of the royalty on the second grade ores. The lessees propose 15 cents and the fee-owners have thus far contended for 20 cents.

The Lake Superior Iron Co. is drifting for a body of ore discovered by the diamond drill at the Section 21 mine. This is northeast from their west shaft. A drift is being driven at the 350-foot level and another will be put in from the 450-foot level. The testing done by the drill indicates a large body of ore, the better quality being found at the lowest point reached by the drill. Indications point to the development of a large deposit of ore at this point.—[Iron Ore, Ishpeming, Mich.

The Eddy Bros., of Bay City, Mich., are reported to have proved up about 15,000,000 tons of ore on the properties they hold, on the west end of the Mesabi range. The investment in the land represents less than $150,000.

The Dunn Iron Mining Co. has taken options on a number of forties between Biwabik and McKinley, on the Mesabi range, and will push exploratory work. Operations have begun on the old Shannon property, west of McKinley. The fee of these properties is in the Rouchleau-Ray Iron Land Co.

The Northern Mineral Workers' Protective Union, which is organizing among the iron miners of the Lake Superior region, and now claims a membership of several thousand men, promises to be a factor in the mining situation this year. It was anticipated that little headway could be made on the Vermilion range, but branches have been established at Soudan and Ely, though only a fraction of the men have identified themselves with the new organization thus far. At Soudan notices were posted about the Minnesota Iron Co.'s properties that the company would not retain in its employ men who joined the union. At Ely, a mass meeting of citizens was held to discuss the matter, and addresses were made by Supts. Pengilly, of the Chandler, Burt, of the Zenith, and Sturtevant, of the Pioneer mine, advising against the formation of a local union. They pointed out that there was no occasion for complaint among the men, that wages would advance as fast as the price of ore permitted, that unions meant strikes, from which men with families were sure to suffer. It is said to be one of the aims of the new union, which is now represented on each of the five iron ranges, to secure the general adoption of the eight-hour system in the Lake Superior region. Some of the mines on the Marquette range are already working eight-hour shifts.

The Genoa mine, of the Minnesota Iron Co., in section 34, 58-17, on the Mesabi range, has shown up well, under thorough test-pitting. About 50 men are employed at present. A boiler house and blacksmith shop are built and a shaft house is under construction. The Genoa lands include six forties.

Not Lower Costs, but Better Tin Plates.

On every hand strenuous efforts are being put forth to reduce the cost of production. We do not believe the efforts are rightly applied, and think that attention devoted to the improvement of brands would be more productive of good in the long run. There is a growing demand for good quality, and the demand has originated in this way. Before American competition began Welsh makers were realizing such profits that there was little incentive to lower the quality of their product, and it was not necessary that consumers be good judges of the quality of the plates they were using. When competition became more keen, quality suffered on both sides the water, and consumers suffered, too—in ignorance—but they soon found out the state of affairs, and are becoming better critics, with the result that their requirements are more exacting. A few tin plate makers have already found that the better quality commands such an enhanced price as to pay for its greater expense. Let the balance profit by their experience.—[Tin and Terne.

BEFORE a committee of the city council of Lorain, O., to consider harbor improvements, the statement was made recently by a representative of the Johnson Co., that 1,500,000 tons of freight by water would be handled by that company in the coming year.

THE LOCATION OF MACHINE SHOPS.

Of the wholly isolated machine shop there are very few examples. There are one or two isolated foundries, special to the last degree of specialization, where work is made in perfection at incredibly low prices; but isolated machine shops are too rare to be taken into account. There are several isolated manufactories of large extent in the United States, which form a most interesting class study, and there are some machine shops which have gained the advantageous effects of isolation by inventing and practicing special methods of dealing with workmen which distinctly separate these establishments from others of equal rank without a sacrifice of the advantages of town location.

Day wages for machinists are at this moment perhaps lowest in Fitchburg and Worcester, Mass., and highest in Toledo, O.; and the labor cost is in all cases the item to be attacked in the battle for low cost machine production. Yet it does not in any way follow that the local day wage for machinists, high or low, should influence the location of a machine shop. The first requirement for low labor cost production is a healthy, contented worker, capable of continued efficient exertion, and not only willing, but eager, to give his utmost effort to advance the designs of the employer. Obviously, this condition of the worker cannot be gained by forcing wages to the lowest possible point. Great successes have clearly proved the propriety, and, it may be safely said, the necessity, of paying high wages to workers, if the greatest reduction of labor cost is to be obtained. Some system must be devised and followed which will make the unit of production the wage-producing factor, regardless of the unit of time. It is highly probable that all seeming contradictions in the machine shop methods known to produce low labor cost work would disappear under correct analysis, and that somewhere in the productive system of the economical establishment there is always to be found a dominating factor of very highly paid labor. This factor may not affect the actual worker's pay, but it must be so placed as to directly affect the worker's output. In view of present examples, it does not seem that the locally prevailing day wage for machinists should have any weight in the selection of a machine shop location.

Transportation costs of raw material and finished product are in all cases fixed charges, incapable of much reduction, and are items worthy of careful consideration in connection with shop location. The industrial meridian of the United States probably does not lie east of Cleveland, and there are considerations which would, perhaps, induce a prudent machine manufacturer to decline a location very much south of Pittsburg or Cincinnati. The vast recent growths of machine shop manufacturing in the area bounded by straight lines drawn between Pittsburg, Cleveland, Chicago and Cincinnati, indicate clearly the great natural advantages of this district for finished metal manufactures.

The establishment of the works of the General Electric Co. at Schenectady is an example of location influenced by proximity to New York and to a local iron producing territory. The Westinghouse Electric Co. is just now taking commodious quarters near its original Allegheny location, while the Siemens-Halske takes a suburban site left vacant by the demise of the Grant Locomotive Works, on the prairie seven miles west of Chicago court house.

So far the supposed vast advantage of power supplied from Niagara Falls does not cut any figure at all as a dominating factor of shop location. It is even denied that at near-by Buffalo Niagara Falls motive power can be furnished more cheaply than steam power, and machine shop motive power is, in a vast majority of cases, a very small cost item in the grand total of production outlay.

A more extended consideration of the subject will, it is believed, fully warrant the conclusion that the character of the workers obtainable, the health and comfort of the workers, and the fixed charges of transportation of both raw material and finished product, should be the considerations deciding the location of a machine shop intending removal from its present location.—[Extract from an article in the April Engineering Magazine, on "Modern Machine Shop Economics," by Horace L. Arnold.

MABEL FURNACE, Sharpsville, Pa., resumes this week.

MACHINE SHOP AND FOUNDRY.

The National Convention of Foundrymen.—Secretary Howard Evans, of the Foundrymen's Association, Philadelphia, is making a vigorous campaign of publicity and of programme preparation, for the National convention of foundrymen, to be held at the Manufacturers' Club, Philadelphia, May 12, 13 and 14. In one of his preliminary announcements Secretary Evans says:

"This being the first convention ever held in the United States, it will be unusually interesting, the object being to bring about good feeling among the foundrymen of the country, present papers of interest to them and encourage the formation of foundrymen's associations in all parts of the country, believing in the end that it will elevate the trade. We have arranged for cut rates of fare and hotel accommodations. The wives and lady friends of the delegates are also invited. Each visitor will be known as a delegate, representing his firm or corporation, and is expected to join in the disussions on the various subjects presented. The call for this convention will be made by the Eastern and Western Foundrymen's Associations combined."

The programme of papers includes contributions from well known authorities on foundry practice and on cast iron metallurgy, and the discussions cannot fail to be of great value. It is expected, also, that interesting trips to various plants in Philadelphia will be arranged. Secretary Evans has been indefatigable in his efforts to make the convention a success and through it to arouse interest in foundrymen's associations. The Western Foundrymen's Association, and associations in Boston, in Texas, and in the District of Columbia, have followed the plan of organization initiated at Philadelphia and the aim is to make associated investigation and comparisons of methods and practice, through the multiplication of these organizations, more of a feature among the foundrymen of the United States. A goodly delegation from the Western Foundrymen's Association will go to Philadelphia, and it is to be hoped the representation of individual foundries, East and West, will be large. Invitations are being sent broadcast, and already the Philadelphia committee have encouraging assurances concerning the attendance.

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Stretching a Lathe.—Probably every machinist employed upon shop work has had occasion to enlarge a lathe, either in length or swing, during some portion of his career. With the art of blocking up a lathe he is undoubtedly familiar; but not every shop is fitted with permanent cast iron blocks, neatly finished and accurately planed, which may be used with the delay of only a few minutes when it is necessary to block up a lathe. Such blocks should be provided in every shop where a blocking operation is likely to be necessary. An extension to the lathe bed may be provided in the same manner. Lathes which do not possess a cross feed may be equipped in a very few minutes by removing the handle from the cross speed screw and applying a ratchet similar to that used upon a ratchet drill. A cord is attached to the end of the ratchet handle and carried upwards over a small pulley conveniently located. The cord is passed downwards over another pulley and brought to a lever which extends across the lathe backing of the gearing. One or two legs can be attached to the lathe spindle and made to raise the above mentioned lever every time they pass it; the lever is attached to the cord above named and motion being connected thereto is transmitted to the ratchet, giving the required motion to the cross speed screw. Another very good arrangement is to select a large gear of a suitable size and insert a pin at some distance from the center, to which the cord may be attached, thus forming a sort of crank which gives the required length of motion to the cord.—[Tradesman.

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Home-Made Tool Building.—Do not try to make tools in your shop if you are engaged in building water wheels, steam engines, or some other article differing greatly from machine tool work. You can do it, of course, but it will not be done as well as it would be in a shop where such tools are made a specialty of. It will also cost more, probably double what it would to buy the finished product. The reason is, your shop is not fitted for the work; your tools are different; your men are not accustomed to it, and the material in use in your foundry, both sand and iron, may not be adapted for the castings required for the special tools.—[James F. Hobart, in the Tradesman.

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Ponderous Electrically-Driven Tool.—One of the heaviest machine tools in the works of the Granite City Steel Co., at Granite City, Ill., is an immense pair of shears driven by direct-connected electric motors. The shears weigh between 90,000 and 95,000 pounds, with motor, and were built expressly for this plant by the Frank-Kneeland Machine Co., of Pittsburg, Pa. The machine is designed to cut up steel billets of 4½-inch section and round bars of a section equal to that of railway axles. The knives on this machine are 18 inches long, seven inches deep and 2½ inches thick. The bed weighs 44,000 pounds, and its great weight enables the powerful shock due to heavy cutting to be absorbed by the inertia of its mass. The main pin or hinge about which the movable jaw rocks is a low phosphorus steel forging, eight inches in diameter, and is kept from turning in its bearings by a long feather or key. The lever, the movable blade of the tool, is 14 inches thick where the knife is attached, this unusual thickness being provided to resist the heavy cross-strain produced by dull knives. The electric motor makes but 500 revolutions a minute at regular speed, and is controlled by a specially designed rheostat, so that the start may be made very slowly, an important matter on account of the great power required to start the heavy fly-wheel and the gearing by which the lever is moved.

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Electrical Equipment for Traveling Crane.—In a paper read before the Worcester Polytechnic Institute, Chas. L. Griffin holds that electrical traveling cranes should be installed on circuits of their own—not an independent circuit for each crane, but a general crane circuit independent of lighting circuits. This for the reason that the great variation in demand for current by the crane will inevitably affect the lights and cause them to flicker. The crane load varies from zero to maximum almost instantaneously; and even if the engine governor responds quickly enough, the compounding of the dynamo will not. Further than this, it is considered bad policy to depend upon a single dynamo for two such important services as light and power. Mr. Griffin would provide a compound-wound generator, designed to deliver current at 250 volts pressure, giving an allowance of about 12 per cent drop to 220 volts at the motors. The variation in demand for current is much more sudden with crane than with street car service. With a single crane the entire load comes on at once, but with several cranes on the same circuit this would not be liable to happen. The service being always intermittent gives intervals for the generator to cool down, and hence a somewhat smaller generator may be used than one designed for the same output of current during an all-day load. With a 20-ton crane designed to lift at 12 feet per minute, with 100 feet per minute trolley travel and 225 feet bridge travel, the hoisting motor should be of 25 horse power, the trolly travel motor of three horse power, and the bridge travel motor of 12 horse power—these measurements being made in electrical horse power delivered at the motor terminals. The figures given for the hoisting motor are based on an efficiency of 60 per cent between current and load.

G. W. Stevens, superintendent of motive power of the L. S. & M. S. Ry. Co., Cleveland, will shortly purchase the following equipment: One 2,500 lb. steam hammer (suitable for locomotive frame work); three belt air compressors (capable of accumulating 125 cu. ft. of air at 80 lbs. pressure in 10 minutes); one single head, 36″x36″x12′ bed, planer (without countershaft); two turret head, bolt and stud machines; one ½ to 2″ double bolt cutters; one 42″ triple geared lathe (to turn 7 ft. between centers); one 36″ open side planer; one turret head brass lathe; seven machines to be operated by compressed air (for tapping staybolts, operating drills, etc.)

J. P. Garvey, of the American Wire Nail Co., Anderson, Ind., died March 22, aged 77.

FEED-WATER HEATING AND PURIFYING.

The economies resulting from the employment of exhaust steam to heat feed-water are getting better recognition from steam-users than ever before, with the result that the care of boilers is having more attention than in the days of larger margins when waste products were regarded as necessary losses. To-day new boiler installations are made with every provision for economical operation, important among such equipment being feet-water heaters and purifiers. For these the claim is well substantiated, that they economize either by saving fuel or by increasing the steaming capacity of boilers, giving longer life and obviating the necessity of the repairs incident to unequal expansion and contraction with cold feed-water. It is computed that for every 10° added to the temperature of the feed-water by exhaust steam nearly one per cent of fuel is saved. On this basis, a feed-water heater that delivers the feed-water at a temperature of from 208° to 212°, or from 148° to 152° above that of the water supply, would save over 13 per cent of fuel. Another saving is effected, if at the same time that the water is heated, its impurities are removed and the formation of destructive and heat absorbing scale prevented.

The problem in connection with the heating and purifying of feed-water is to obtain the best mechanical device to insure maximum temperature and purification, to give automatic regulation, ease of operation and least trouble from repairs. The illustrations which accompany this article are of the Cochrane heater and purifier, which has been perfected through 12 years of use and of constant experiment. It is the open type heater from which it is found that a maximum temperature can be secured, the quantity of water that can be heated being only limited by the quantity of exhaust steam and the amount of cold water that can be brought together; that the escape of gases and the precipitation of carbonates are facilitated; the water of condensation is saved, and internal water-tight compartments obviated, avoiding repairs due to leakage, rupture or collapse.

The accompanying cuts make clear the construction and the operation of the Cochrane heater. It is rectangular in horizontal section and, except in the smaller heaters, which are cast in one piece, each side is formed of one or more cast iron plates bolted together at the flanges and made steam and water tight with rust joints calked from the inside. Fig. 6 illustrates the joint construction. Stay tubes and bolts are used in the larger sizes. Fig. 7 shows this method of staying the sides. A hollow cast iron stay tube is employed, with 1 5-16-in. wrought iron bolt and close-ended nut. The top and bottom plates are of cast iron, the latter being either dished or set at a slight angle, to permit of perfect drainage through the blow-off pipe. The cast iron shell is used in the Cochrane heater, in preference to wrought iron or steel, because it has been found to withstand better the rust and corrosion of feed waters. The oil separator, through which the exhaust steam enters the heater, is bolted on the outside of the shell. Drainage is through a drip pipe connected to and sealed by the water trap on the waste pipe. The upper portion of the heater contains separate interchangable trays, varying in number and arrangement according to the size of the heater. Each tray rests on the one below, the bottom one being supported by projections on the sides of the heater. They are fixed in place to prevent any noise from the pulsation of the exhaust, and are so spaced that the area of the passage-ways between them largely exceeds that of the area of the inlet or outlet openings, to give the exhaust a perfectly free passage through the heater.

The cold water supply is brought in at the top of the heater, through an automatic balanced valve (Figs. 1 and 2) governed by a copper ball float which rests on the surface of water in

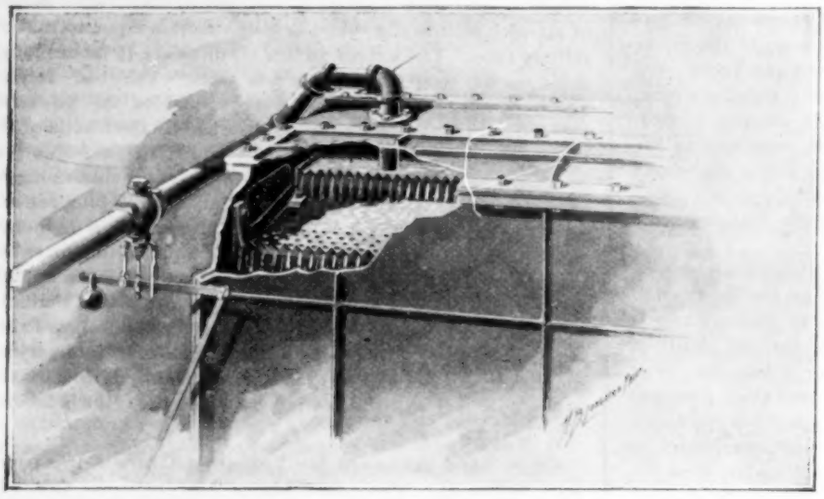

FIG. 1.—COCHRANE HEATER AND PURIFIER—REGULATING VALVE AND WATER DISTRIBUTION.

FIG. 6.—FLANGED JOINT.

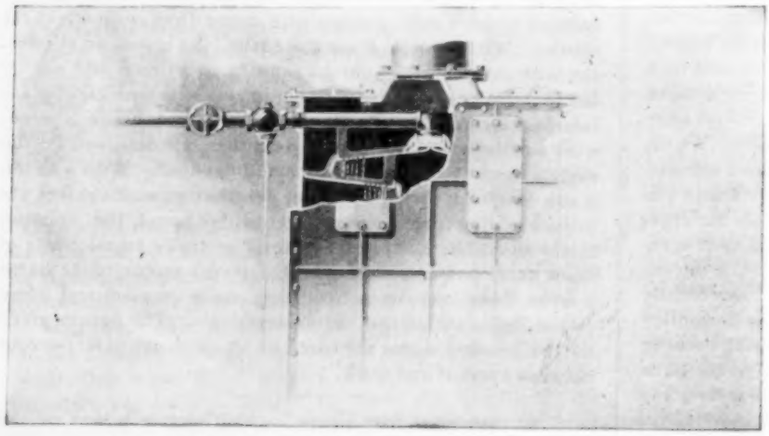

FIG. 2.—DISTRIBUTING TRAYS AND CLEANING DOORS.

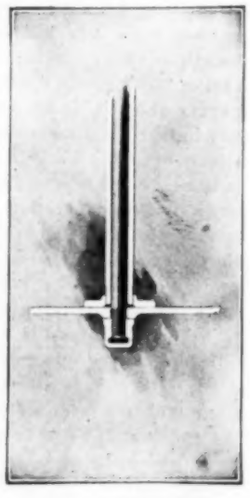

FIG. 7.—STAY ROD.

heater and keeps it at a uniform height, admitting new water as needed. This float Fig. 3 has a hollow stem which comes out through a stuffing box, and would drain itself in case of any possible accident causing a leak. The water supply pipe then turns down into a trough shown in Fig. 1 which forms a water seal over its mouth and prevents steam entering it. This trough, which has a saw-tooth edge, then distributes the water uniformly over the trays. The finely divided water then passes slowly over the heated trays and from one to another, intimately mixing with the exhaust steam as it passes through it, and condenses enough steam to raise it to 210 degrees, within a couple of degrees of the temperature of the exhaust itself, allowing for radiation. The condensed exhaust and new water then drop into the lower half of heater, which is large enough to allow the water to settle slowly and deposit its impurities, and a perforated tray, Fig. 4, is provided to support a layer of coke or other suitable material, through which the water is filtered.

Before the water is heated to 200 degrees the carbonic acid gas holding carbonates of lime and magnesia in solution is driven off and the carbonates are deposited on the trays and filtering material along with the mud, etc. The filtering material is easily inserted and removed through cleaning doors provided for that purpose, and the trays are also easily cleaned. Vegetable matter and light impurities are flushed out over the skimmer which empties into the water seal on the side of the heater. The filtering material may be cleaned and heavy impurities washed out through blow-off from bottom to waste pipe, as shown in Fig. 5.

The supply of hot water is taken from the side of heater under a hood, Fig. 4, which compels all the water to settle first, being open only at the bottom and ventilated at the top by a small pipe to allow any steam in the hot water to return to the top of the heater, thus preventing trouble in feed pumps. The exhaust is brought into the side of the heater through an oil separator, then passes up through the trays doing its work, and any not condensed passes out at top. The oil separator is similar to and operates on the same principle as the Cochrane steam separator, and extracts all of the cylinder oil, and drains it into the overflow and water seal, as shown in Fig. 5. This does away with the old objection to open heaters, and keeps the oil out of the boiler.

The condensation which takes place has a tendency to reduce back pressure on engine and the heater itself can cause no back pressure on account of its large openings. A water gauge shows the height of the water in heater at all times and a thermometer in outlet to pump, shows the feed temperature.

Provision is made for examining and cleaning all parts of the heater without disturbing any pipe connections. The cleaning doors, manhole, and other openings are conveniently located and so arranged that they can be easily removed and replaced. The Cochrane heater is manufactured by the Harrison Safety Boiler Works, Philadelphia. Attractive and well illustrated descriptive matter is sent on application.

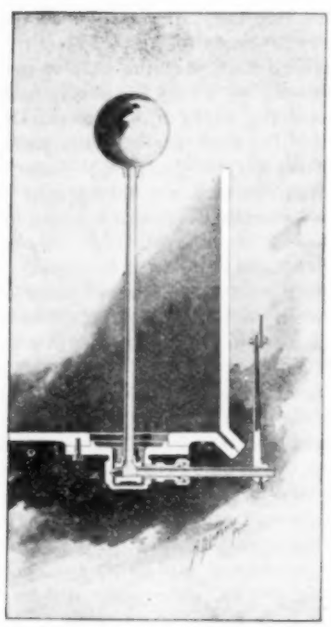

FIG. 3.—REGULATING FLOAT AND ITS VENTILATION.

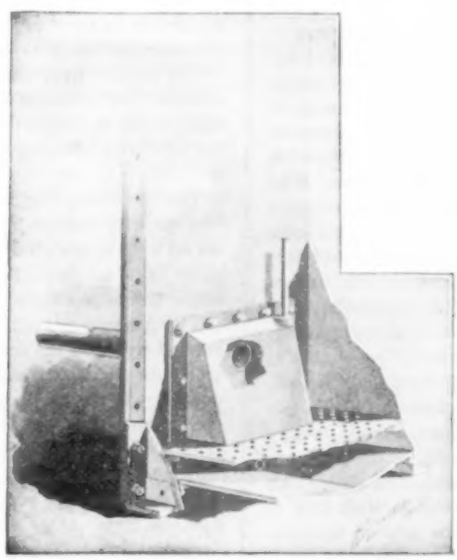

FIG. 4.—FILTERING TRAY AND OUTLET TO PUMP.

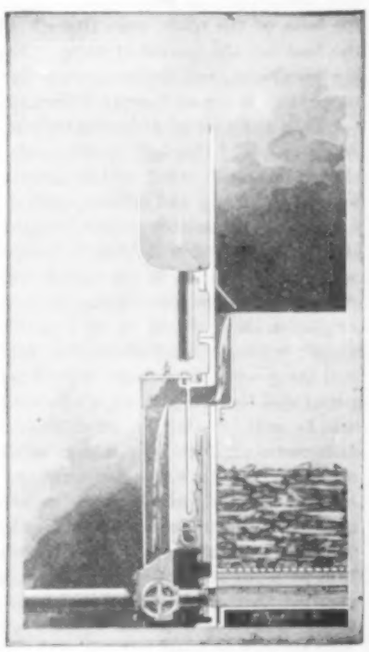

FIG. 5.—OVERFLOW-WATER SEAL, BLOW-OFF AND SKIMMER.

Castings or Forgings.

A noteworthy peculiarity of American manufacturing and machine-shop practice is the employment of castings where Europeans would use forgings, and, where castings are inadmissible, of die forgings, made either by the drop or by the hydraulic system, instead of open forging. Average American wrought iron being somewhat inferior, and average American cast iron greatly superior to that of European make, and casting being so much cheaper than forging and calling for less skilled labor, which might, in fact, not be obtainable, castings have with Americans largely taken the place of forgings, even for complicated designs and where tensile strength is called for. This has led to scientific designing and skill in molding and casting, which have, further, permitted and encouraged the use of castings, and similarly discouraged skill in open forging.

The use of malleable iron in especial, when many pieces alike, but of irregular outline, are to be made, has received a wonderful development, and not only such parts as rocker-arms, but even complicated pieces, are so made. True, they may get somewhat twisted in annealing, but they are easily set right by well-directed shaping, and even if 10 per cent were irretrievably spoiled, there would be a great saving over open forging.

The selection of cast iron over wrought iron is not dependent upon the ability of the mechanic to procure or to handle it, but often depends on the inherent quality of the surface-layers of the metal for such purposes, say for gear wheels, as call for compressive strength and resistance to abrasion; and here also comes in the advantage of accurately molded cast iron gear wheels, the teeth of which, preserving the slightly silicious skin and the slightly chilled outer layer due to pouring in cold sand, resist abrasion, while possessing sufficient internal strength to stand the bending, and sometimes slightly twisting, stresses produced by meshing while transmitting power. Casting the teeth too large and the spaces too small, and cleaning out with milling-cutters, often considerably lessens the value of the wheels for such purposes as call for severe wear while imperfectly lubricated, and even while subjected to the action of grit.—[Robert Grimshaw, in Cassier's Magazine for April.

A POINT FOR MACHINERY EXPORTERS.

The failure of some manufacturers in the United States to appreciate the need of the thorough packing of goods shipped to far-off points has been commented on by a number of writers on methods of extending our foreign trade. This feature is emphasized again by Albert Spies in an article prepared for the April *Cassier's Magazine*. We quote from it as follows:

"Machinery builders who intend to cater to foreign buyers especially to those in very far-off countries, or in countries accessible only by roundabout routes, will serve themselves well if they will have an eye to the way in which their goods are packed for shipment. English builders are almost proverbially careful in this respect, with the result that what they ship generally reaches its destination in good order, and will operate satisfactorily when put to work, while the products of their less painstaking competitors—often Americans—come to the purchaser battered and broken, perhaps, with possibly some parts missing, and become at once annoying provocations to the man who wants them, and wants them in a hurry, with no time to spare to send perhaps thousands of miles for a duplicate piece, or even a new machine. There can be but one result from such an experience—the careful shipper will secure the bulk of the trade, even though his machinery may not be the best nor the lowest in price. The time which he saves for the purchaser, and the annoyance from which he relieves him, more than make up for the difference.

"Take the case of an ordinary engine, to go, say, to South America. The English builder will fix the engine to heavy skids, and build what will be practically, a substantial house around it, strong and secure against all possible battering of a long voyage and rough handling. When this engine reaches its destination there is little to be done to get it into shape for work. Everything is complete and in good order. The American builder, per contra, will, in most cases, secure the engine to the lightest skids that he thinks can be made to stand; a flimsy bit of timbering will go around the outside, and the governor, perhaps, will be wrapped up in some brown paper and tied on with a bit of string. Then the whole thing will be sent off with a trust in Providence that, unfortunately, does not always work in favor of the buyer. The engine is almost certain to suffer in transit, or the governor to be lost, and the builder's or shipper's reputation likewise. What is true of engines is true of all other machinery. The far-away purchaser naturally will prefer those goods which come to him with the least effects of travel, wear and tear, and which can be put to work with a minimum of trouble and loss of time. There is a lesson in this which the export machine builder should heed."

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

D. Pitts, Porter, Ind., will buy either a two or three h. p. gasoline engine or a four or five h. p. boiler, in good condition.

The Salem (N. C.) Iron Works will put in additional machinery, including air compressors. Bids are asked on the latter.

The Miller & Jones Furniture Co., Ft. Smith, Ark., is in the market for an automatic knife grinder and a fluting machine.

The Tyler Mfg. Co., of Hartford, Conn., has been incorporated, with a capital of $100,000, to manufacture and sell articles of metal.

The Reedy Elevator Co. has been incorporated at Chicago, with a capital stock of $60,000, to manufacture elevators, by Ellen T. Reedy, William H. Reedy and William I. Reedy.

The Duryea Mfg. Co. has been incorporated at Peoria, Ill., with a capital stock of $50,000, to manufacture motors, vehicles, etc., by Deloss S. Brown, H. N. Fahenstock and Charles F. Duryea.

The Easton Foundry & Machine Co., of Easton, Pa., has been incorporated with $20,000 capital. The directors are: A. G. Nesbit, Fred Nesbit, G. F. Nesbit, F. G. Ormsby and G. B. Sherry.

John H. Blake will soon open a factory at Batavia, N. Y., for the manufacture of a new magazine gun of which he is the inventor, and which has lately been adopted by the Government.

The Tyler Valve Co., of Corning, N. Y., has been incorporated with $10,000 capital. The directors are: W. G. Dean, of Prattsburg, G. E. Tyler, F. H. Viele and C. L. B. Tyler, of Corning.

W. P. Holliday, of Ironton, O., who has talked of locating stove works at Knoxville, Tenn., has definitely decided to establish the plant at Middlesborough, Ky. A company will be incorporated with capital of $30,000.

Geo. A. Dinsmore and Chas. W. Bartholmes, of Philadelphia, have formed a partnership to carry on a general machine shop and repair business at Brattleboro, Vt., having rented the Valley machine shop. They will also manufacture a line of machine tools.

New Construction:—

George Main is building a new machine shop at Quincy, Mass.

The Hubbard Shovel Works, Pittsburg, burned a short time ago, will be rebuilt on the old site, on a larger scale.

Rawson & Morrison, Cambridgeport, Mass., will build a new machine shop, brick with steel frame, 60x150 feet, two stories high, on the site of their present shop.

Cooper Bros., of Cortland, N. Y., are purchasing machinery for their new foundry and machine shop, which will take the place of the plant destroyed by fire recently.

Plans are now being prepared for a machine shop to cost $60,000, to be built at Port Royal, S. C., by the government for construction work and repairing slight injuries to vessels.

The Berlin Iron Bridge Co., of East Berlin, Conn., has a contract with the Carteret Steel Co., of Carteret, N. J., for a steel frame to support the furnaces which are to be placed in the new iron building which the Berlin Co. is also erecting for it.

The Pittsburg Forge & Iron Co., it is reported in Pittsburg newspapers, contemplates the erection of a steel plant at Wood's Run, Allegheny. Calvin Wells, president of the company, says the project is in contemplation but that definite announcement cannot be made as yet.

The American Weldless Steel Tube Co., of Toledo, O., has started work on the foundations of its new buildings and contracts for the iron work have been placed at Pittsburg. The company expects to complete the buildings by May and to begin manufacturing seamless steel tubing in July.

Work has begun on the mammoth rolling mill plant of the Block-Pollock Co., at Carthage, near Cincinnati. This company purchased 19 acres of land west of Mill Creek and opposite the Hess Axle & Spring Works. The plant will be of large capacity. The C., H. & D. R. R. will lay one main switch and four side tracks to the plant.

The Ellwood Weldless Tube Co., of Ellwood City, Pa., has purchased six acres of ground in the eastern part of Ellwood City, on which it has begun the erection of another large seamless tube plant. The mills and appliances will be of a particular design, and the processes used are covered by patents of the company. The plant is expected to be in operation by Sept. 1.

The Michigan-Peninsular Co., of Detroit, Mich., has placed a contract with the Berlin Iron Bridge Co., of East Berlin, Conn., for a new foundry building 160 feet square. It is one story, has a steel framework throughout, and is so designed that the lower chords of the trusses support runways extending the whole length of the building. These runways carry trolleys having a capacity of 2,000 pounds. By means of these overhead trolleys the molten metal is conveyed quickly and easily from the cupolas to any part of the casting floor.

The Fox Pressed Steel Co., has recently been formed by New York and Pittsburg capitalists, and will locate a plant for the manufacture of Fox pressed steel trucks at Pittsburg. Ample capital has been provided and the company has purchased five acres of ground on the Allegheny Valley Railway. The work of erecting the plant will begin at once. The contract for the buildings and machinery has been let to Mackintosh, Hemphill & Co., of Pittsburg. The Fox pressed steel truck will be produced about Oct. 1. The plans call for a main building 450x112 feet. In this building are six power shears, eight hydraulic presses, two bending machines, 11 hydraulic punches, seven power punches, 24 hydraulic riveting ma

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chines, 16 hydraulic cranes, five electric cranes, and the necessary straightening tables and other smaller tools. In another building, 350x62 feet, will be the machine shop, blacksmith shop, pump house, boiler house, electric light plant, and a small building to contain the gas producers. Cars will run right into the building on a private track and will be loaded and unloaded by overhead electric traveling cranes. The plant will be so constructed that the raw material will be received at one end, put through the various processes of manufacture and loaded on cars at the other end, thus preventing unnecessary and costly rehandling. From 300 to 400 finished trucks per day will be made and employment given to from 1,000 to 1,200 men. There are now about 60,000 Fox trucks in use and the demand is constantly increasing. The material for these trucks will be principally supplied by the Carbon Steel Co., of Pittsburg, and will conform with the specifications of that used by the Fox Solid Pressed Steel Co., of Joliet, Ill. The Fox Pressed Steel Co. will also manufacture all forms of pressed steel that enter into the construction of railroad equipment.

Additions, Enlargements, Removals, Etc.:—

The Lehigh Valley Railroad Co. will remove its Cortland, N. Y., repair shops to Sayre, N. Y.

The Stroh-McIntyre Co., of Massillon, O., manufacturers of artesian well drilling machines, fence picket machines and other machinery, will move to Barberton, O.

The Derwent Foundry & Machine Works, of Ellwood City, Pa., have the foundation completed for a large addition to their shops. The working force of the establishment will be largely increased by the addition to the plant.

The Schoen Mfg. Co., of Pittsburg, manufacturers of specialties in pressed steel for railways and car construction, has been reorganized and is now known as the Schoen Pressed Steel Co. The capital has been increased and extensive additions to equipment and buildings will be made.

The Pennsylvania Steel Refining Co., of Philadelphia, will build a new plant at Greensburg, Pa., the object of the removal being to get cheaper fuel and other raw material. The company has a process of refining open-hearth steel whereby it is made into a tool steel without remelting in a crucible. The new plant is adjacent to that of the Pittsburg Tool Steel Co.

The Gould Coupler Works Co., of Depew, N. Y., will add another large furnace to the foundry. The foundry is 750 feet long, and the annealing room is said to be the largest in America. The capacity of the Gould forge, which began operations about the first of the year, has been increased by the addition of a steam engine and a pair of shears. For some time it has been in operation night and day.

The Ellwood Weldless Tube Co., Ellwood, Pa., closed last week for six acres of land and additional shops will be erected. About 1,000 men will be employed when the addition is completed. Most of the product is used for bicycles, but much of it is turned out as boiler tubing. The raw material is the hallowed Swedish bloom. The capital is $200,000, and the officers are as follows: F. Eusworth, president; H. W. Hartman, vice-president; H. A. Paul, treasurer; R. C. Stiefel, general superintendent. Tubes are drawn by the Ralph C. Stiefel patent process.

Fires and Accidents:—

Joseph B. Reed's foundry at Cairo, Ill., was destroyed by fire March 28.

The engine house of the Wellston Iron & Steel Co., of Wellston, O., was destroyed by fire. Loss $5,000; insurance, $1,000.

General Industrial Notes:—

The Greenfield (Ind.) Iron & Nail Works have been sold at receiver's sale for $18,000.

At the Eagle Mill, Ironton, O., experiments have been successfully made in cold rolling.

The Grand Crossing Tack Co., Chicago, has increased its capital stock from $50,000 to $200,000.

The Finished Steel Co., of Youngstown, O., has received a good order for shafting from Mexico.

The Detroit Iron Furnace Co., of Detroit, Mich., is to start its kilns at Gaylord and burn charcoal.

The Baltimore & Ohio Southwestern railway shops at Washington, Ind., have closed down indefinitely.

The Bear Spring furnace, at Clarksville, Tenn., will probably be blown in about the first of next month.

The United States Car Co., New Decatur, Ala., is overhauling and putting in order its machinery, preparatory to resuming operations.

March 19, the Cambria Iron Co., Johnstown, Pa., declared a divident of two per cent, payable on April 1 to stockholders of record March 18.

At the Edgar Thomson Steel Works an order of 5,000 tons of 60-ft. rails, 100 lbs. to the yard, has been rolled recently for the Pennsylvania Co.

The North Branch Steel Co., Danville, Pa., has been awarded a contract to supply the Union Traction Co., of Philadelphia, with 1,000 tons of heavy steel rails.

The plant of the Altoona Iron Co., Altoona, Pa., manufacturers of bar, band and nut iron, has been put in full operation, with a number of good sized orders ahead.

Ahrens & Ott, extensive iron and brass manufacturers at Louisville, have shut down for an indefinite period, because of dull trade. The firm employs about 600 men.

The Robesonia furnace, at Robesonia, Pa., has been blown out for repairs. Work will be commenced at once, but will hardly be completed in time for the stack to resume before fall.

The Wais & Roos Punch & Shear Co., of Cincinnati, has recently shipped to the Marshall Iron Co., of Newport, Del., a heavy plate shear with engine. It was built for one-inch plates.

The Davis & Egan Machine Tool Co., of Cincinnati, O., has just completed a large shipment to its new store in New York City, and will make another large shipment this week. The new store is larger and finer than the old one, and the com-

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pany will be enabled to carry a large stock of its latest machine tools.

The block of Semet-Solvay retort ovens at Dunbar, Pa., will soon be ready for operation. Ground was broken for the erection of these ovens in July, 1895. Work has been going on ever since.

The Elliott-Washington Steel Co., of New Castle, Pa., has been running its plant steadily night and day the past year, the only lost time being by reason of breakages. It is planned to build a larger plant in the near future.

At St. Louis, Pullis Bros.' Foundry Co., established in 1839, has made an assignmeat. Urgent liabilities are $51,000 and assets $500,000. Importunate creditors forced the company to this step. The business will not be interrupted.

J. F. Sieberling & Co., Akron, O., manufacturers of mowers and reapers, made an assignment March 24. Liabilities are $400,000, with assets about the same amount. John F. Sieberling has filed mortgages on valuable real estate.

The Sargent Co., of Chicago, manufacturer of open hearth and crucible steel castings, has just completed a 1,500-pound Bessemer converter for making Walrand-Legenisel steel, and is prepared to make steel castings by this process.

Employes at the shipyards of Wheeler & Co., West Bay City, Mich., are on a strike against payment of wages by check. The company says that the amount of currency required for a pay is burdensome to handle and dangerous to transmit.

The Robesonia (Pa) furnace, which was blown out a short time ago, was operated for 18 months and in that period made 90,000 tons of iron. Repairs will commence at once. The furnace is owned and operated by the Cornwall Iron Co., Ltd.

The Brown Hoisting & Conveying Co., of Cleveland, recently sold to the Battle Creek Steam Pump Co. a standard overhead tramrail system of one ton capacity, including switches, curves, roller bushed trolleys equipped with triplex blocks, etc., and a light pulley block traveling crane. The company has also sold an extensive two-ton tramrail system, including turntables, etc., to the Detroit Dry Dock Co, for the new shops in the shipyards at Wyandotte, Mich.

The Shenango Valley Steel Co.'s mill at New Castle, Pa., will be idle until the later part of April on account of the recent breaking of the shaft of the big engine. A new bed plate is being put in and other repairs made, pending the arrival of a new shaft.

Robert Martindale & Co., of Indianapolis, real estate agents, as announced elsewhere, offer free factory sites, with free gas and other inducements, to manufacturers. They propose liberal arrangements with first-class factories desiring to change their location.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburg, manufacturer of engines and rolling mill machinery, is very busy at the present time. The company has just closed a contract with the Wyoming Shovel Works, of Wyoming, Pa., for a 16″ special train of rolls complete.

Various reports have originated from the negotiations of Pittsburg capitalists for a considerable tract of land at McKeesport, Pa. They want 25 acres on the Monongahela, near the lines of the B. & O. and Pennsylvania. It is reported that an extensive fuel gas plant, employing retort ovens is projected.

It is reported that a satisfactory settlement has been made between the litigants in the case of the Solar Steel Works, William Clark's Son & Co., of Pittsburg, and that the plant will be taken out of the hands of the sheriff within a short time, and put in operation. The details of the settlement have not been made public.

The American Electric Heating Corporation, which includes all the companies of importance engaged in the manufacture of electric heating apparatus, has been formed, with headquarters in Boston, according to a dispatch. J. Murray Forbes, of Boston, is president of a board of 12 directors, and James I. Ayer, ex-president of the National Electric Light

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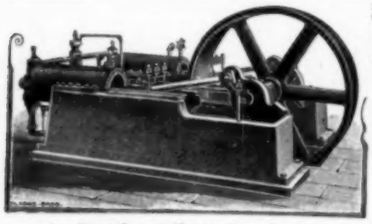

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Association, is general manager. The capital stock will be $10,000,000.

Furnace E of the Edgar Thomson group at Bessemer, Pa., blew in last week after a five months' suspension, in which it has been practically rebuilt. The work of blowing out a salamander was very slow, as dynamite had to be used very cautiously. Furnace D will soon be blown out for repairs. Just now all the stacks are blowing.

The Bucyrus Steam Shovel & Dredge Co.'s works at South Milwaukee were sold March 28 to a number of former stockholders and bondholders for $130,000. The concern will be taken out of the hands of receivers and will be operated by a reorganized and strong company. By arrangements, certain contracts will be completed by the receivers.

The plant of the Norristown Tin Plate Co., Norristown, Pa., has been put in operation after an idleness of about 18 months. The works have eight tinning stacks, which will be devoted exclusively to the production of a high grade of roofing plate, manufactured by a special process. Richard Lewis, formerly manager of the works, has resumed charge.

The report of the Tennessee Coal, Iron & Railroad Co. shows a net profit for the year ending Dec. 31, 1895, of $1,045,000. Deducting from this amount $600,000 interest on bonds, $100,000 for sinking fund and $80,000 for dividends on preferred stock will leave a surplus of $265,000. There is still two years' accumulated interest on the preferred stock, amounting to $160,000 to be paid off.

Though the head of the firm, Mr. Jos. Corns, died in 1892, the Massillon, O., rolling mill has been operated under the name of Joseph Corns & Son until a short time ago, when articles of incorporation were filed at Columbus, for the Corns Iron & Steel Co. James C. Corns is president and general manager and Joseph C. Adams, secretary. The company makes common and refined bar iron. It also makes a specialty of rolling shapes to pattern and iron for agricultural implements.

An Easton, Pa., dispatch referring to the appointment of Willard Sawyer and John Bacon as appraisers of the property of the assigned Glendon Iron Co., says: "The company has expended close to a million dollars on the plant. The liabilities are about $250,000. The company in the seventies stood at the top notch of pig iron producers, and assisted materially in giving to the Lehigh Valley its name for iron output. There are now only two companies in existence, among those which contributed to this fame, that have not either assigned or gone into the hands of receivers—the Thomas Iron Co. and

the Bethlehem Iron Co, both among the strongest concerns in the valley."

Car building, noted by the *Railroad Gazette:* The Toledo & Ohio Central will buy freight cars. For the Chattanooga Southern 50 cars will be ordered for April delivery. At the Madison Car Works, 500 box cars are being built for the Wabash. The Pennsylvania has placed 300 coal cars with the Ohio Falls Car Co. and 100 cars with the Mt. Vernon Car Co. The Haskell & Barker Car Co. has an order for 300 box cars from the Calumet & Blue Island. Of the Wheeling & Lake Erie order, 500 cars went to the United States Car Co. and 250 to the Madison Car Works.

The charcoal furnace of the Antrim Iron Co., at Mancelona, Mich., is doing remarkable work under the management of M. M. Duncan. The recent records are as follows: Week ending Feb. 29—Output, 664 tons; yield of ore, 53.07 per cent; fuel per ton of iron, 1,658 pounds. Week ending March 7—Output, 680 tons; yield of ore, 52.46 per cent; fuel per ton of iron, 1,667 pounds. The temperature of the blast in each case was 750 degrees. The furnace bosh is 10 feet; hearth, six feet; height, 60 feet. The furnace is equipped with iron pipe stoves. This plant was repaired under the designs of Frank C. Roberts & Co., of Philadelphia.

The J. H. McEwen Mfg. Co., of New York, reports having recently closed contracts for the following apparatus: Two railroad generators, 150 k. w. capacity, d. c. to 12x23x26 tandem compound engines for the Hingham (Mass.) Electric R. R.; one 150 k. w. generator, d. c. to 18x16 simple engine, for the Morris Goal Co., Jobs, O.; one 85 k. w. belted generator and one 15x16 simple engine for the Carbondale Fuel Co., Des Moines, Ia.; one 13x14 simple engine for Miner-Hillard Milling Co., Miner's Mills, Pa.; one 15x16 simple engine for O'Neill & Patterson, Bunola, Pa.; one 16x16 simple engine for Ellsworth Morris Coal Co., Sutterville, Pa.; one 16x16 simple engine for W. J. Smith, Mount Pleasant Mines, Scranton, Pa.; one 16x16 simple engine, New York & Pennsylvania Co., Johnsonburg, Pa.; two 200 k. w. generators, d. c. to 14x26x20 tandem compound engine, for Frankford & Tacony Street R. R., Tacony, Pa.; one 10x10 simple engine for Charles S. Solomon & Co., St. James Hotel, Washington, D. C.; one 10x10 and one 12x12 simple engine for Dr. J. S. Gilbert, Bordentown, N. J.; one 30 k. w. generator, d. c. 9x8 simple engine, Kunkle Bros., Pittsburg; one 8x10 simple engine, American Glue Co., Springdale, Pa.; one 8x10 simple engine, Chicago Hardware Mfg. Co., Chicago; one 25 k. w. generator, d. c. to 8x10 engine, Lee & Carroll, Pittsburg; one 25 k. w. belted generator, H. W. Johns Co., New York; one 100 k. w. belted generator, Link-Belt Machinery Co, Chicago; one 80 k. w. belted generator, Westinghouse Light, Heat & Power Co., York, Pa.; one 50 k. w. generator, d. c. to 12x12 engine, German-American Brewing Co., Buffalo; one 75 k. w. generator, d. c. to 13x14 simple engine, Monongahela House, Pittsburg; one 200 k. w. belted generator, Armour Co., Chicago; one each 40 and 60 k. w. belted generators to V. Henry Rothschild & Co., New York, for their Trenton (N. J.) factory. The J. H. McEwen Mfg. Co. will send to any contemplating the installation of steam or electrical equipment a copy of its handsome catalogue recently issued.

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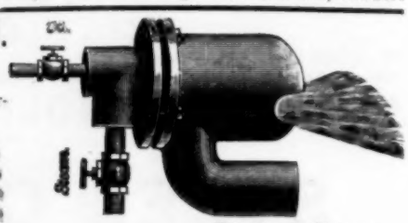

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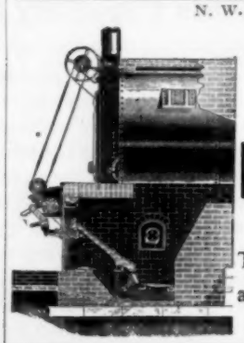

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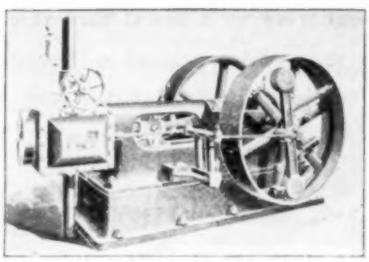

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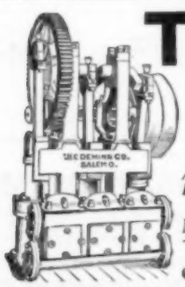

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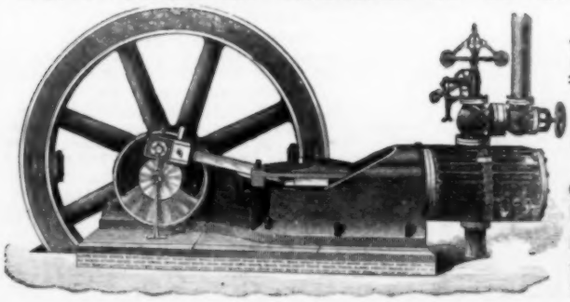

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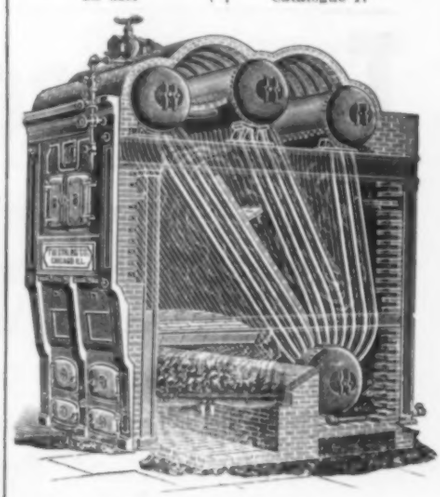

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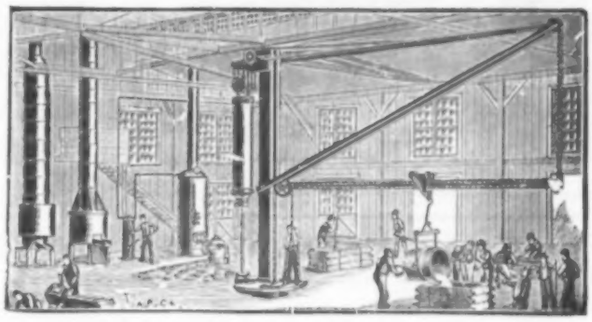

5-ton Steam-Hydraulic Crane in a Foundry.

One reason why the Ridgway Crane is such a money maker in the foundry is because it has that same peculiar elasticity as the old rope cranes. By the way, these rope cranes are still used where they make fine statuary. Now if this quality is the thing for the delicate and costly molds of statuary, isn't it the thing for your molds? Isn't it as important to you to have your castings as good as anybody.

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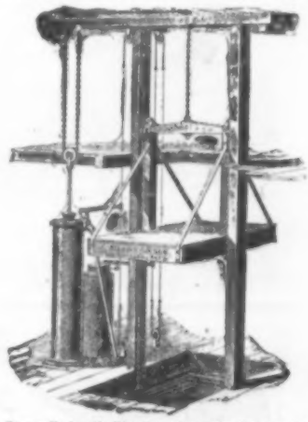

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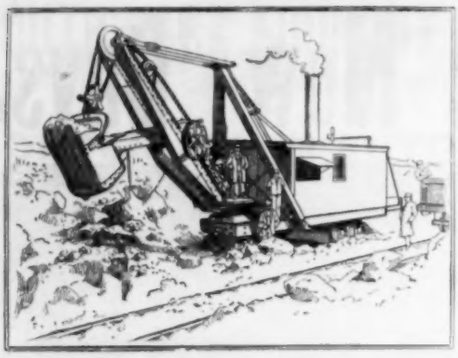

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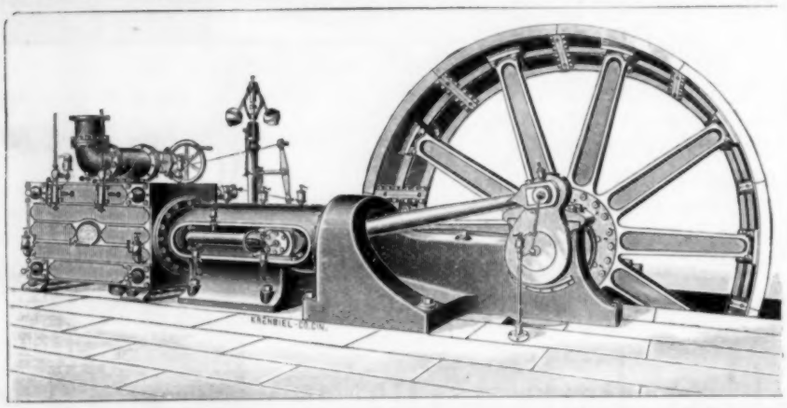

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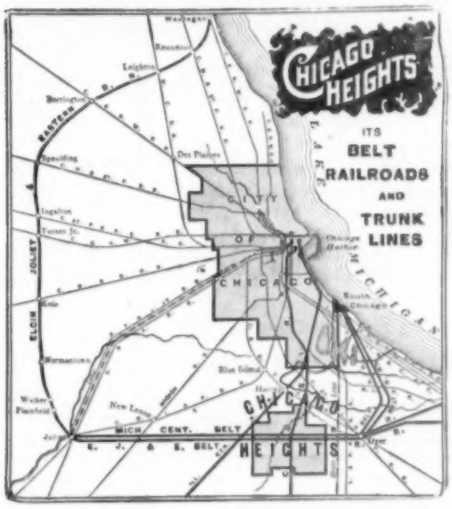

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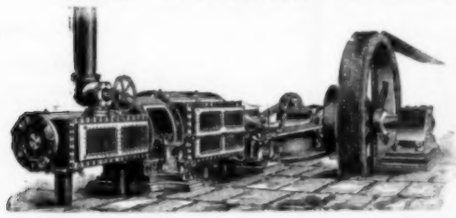

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Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	* 5:00 pm	* 8:30 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:10 am	* 5:45 pm
Akron and Columbus	* 8:10 am	* 5:45 pm
Akron, Columbus & Zanesville	†12:45 pm	†12:10 pm
Columbus and Cincinnati	* 8:00 pm	* 7:30 am

The Cleveland Terminal & Valley R. R. Co

Depot foot of So. Water St.
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	Arrive.	Depart.
Valley Jctn. & Way Stations	*6:30 P M	*7:10 A M
Akron, Canton & Valley	*10:10 A M	*3:15 P M
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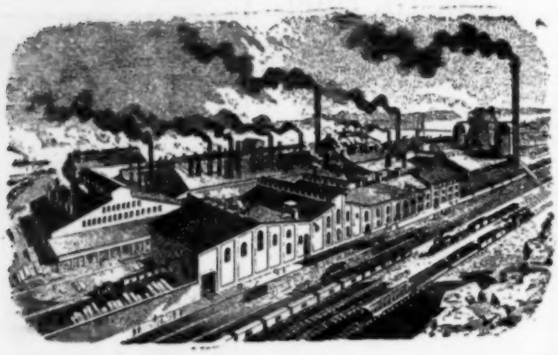
Successors to MOOREHEAD-McCLEANE CO.



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Don't Waste Money in Your Pattern Shop.

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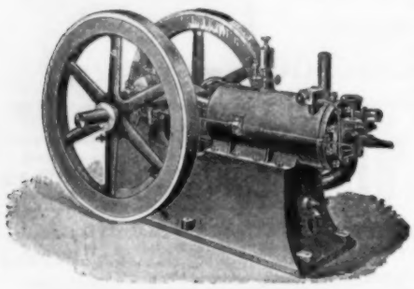

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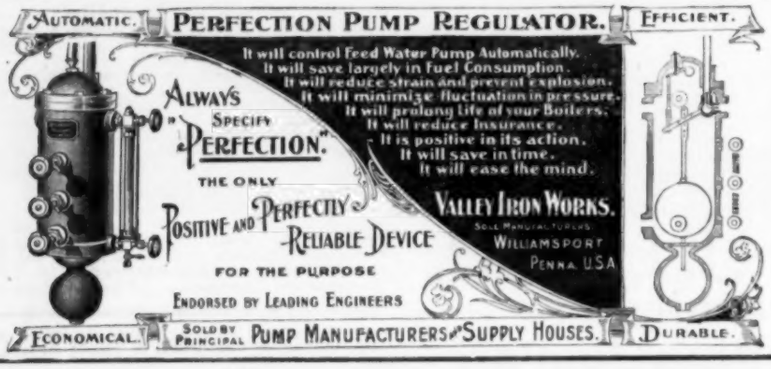
AUTOMATIC. PERFECTION PUMP REGULATOR. EFFICIENT.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It will prolong life of your Boilers.
It will reduce Insurance.
It is positive in its action.
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ALWAYS SPECIFY "PERFECTION."
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ENDORSED BY LEADING ENGINEERS
VALLEY IRON WORKS.
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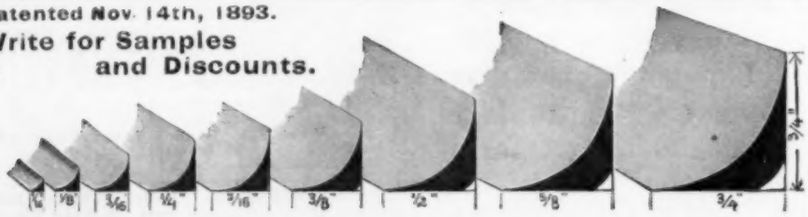

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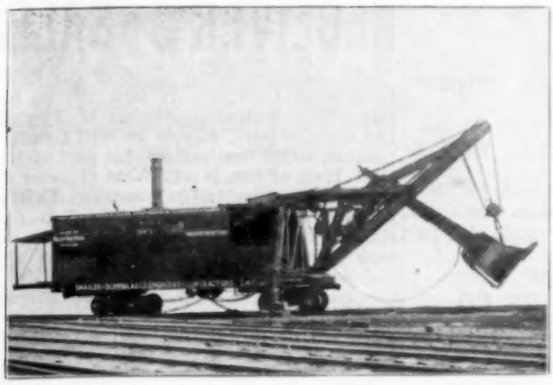

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Heavy Power Jacks, Independent
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2 1-2 Yard Dipper.
65 tons shipping weight.

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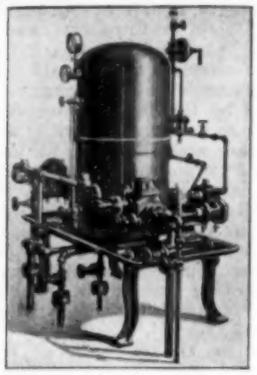

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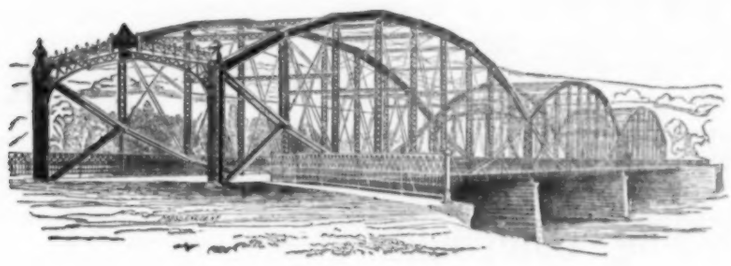

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COMPLETE DIRECTORY

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RECEIVER'S SALE.

The manufacturing plant of the Joliet Enterprise Company is now offered for sale. This property consists of Twenty (20) acres of land, situate in Will County, Illinois, and described as that part of the East Half of the North-West Quarter of Section Twenty (20), Township Thirty-five (35) North and of Range Ten (10) East of the Third Principal Meridan, as lies between the right-of-way of the Chicago, Rock Island & Paciffic Railway Company on the North and the Illinois and Michigan Canal, including its reserve strip, on the South, together with all the buildings and improvements situate thereon, and the tools, machinery, appliances, boilers, engines and other articles of personal property, situate in said buildings or located upon said property, heretofore obtained, used and employed for the purpose of carrying on, on said real estate, a manufacturing business, such as was carried on by the Joliet Enterprise Company, prior to the appointment of the Receiver, together with all right, title and interest of said corporation, George M. Fish or the Receiver in and to the Capital Stock of the Columbia Wire Company and Columbia Patent Company or both, with all rights and privileges thereunder, it being the intent and purpose to sell all said real estate and other property as a whole, undivided and as a manufacturing plant and so convey the same.

This sale is by the direction of the Circuit court of Will County, Illinois, which has had jurisdiction of the Joliet Enterprize Company and its assets for over three years, in a suit to wind up the corporation and distribute its assets among its creditors and under a decree for a sale without redemption, which has already been affirmed by the Supreme Court of the State of Illinois.

This plant is modern and complete in all its appointments having been operated only about ninety (90) days. The capacity of the plant is Two Hundred (200) tons and upwards of rods per day. It has One Hundred (100) drawing blocks, Seventy-five (75) barbed wire fence machines, Eight (8) bale tie machines, Thirty-six (36) wire nail machines. Its location is the best and just outside the City limits of the city of Joliet. Freight rates are the same as Chicago. The buildings are constructed of brick on stone foundations. On the North it is connected with the Chicago, Rock Island and Pacific Railway and on the South with the Illinois and Michigan Canal. There is nearly a mile of side tracks along side of and connected with this property. The warehouse is in a safe location and is One Hundred and Twenty (120) by Four Hundred (400) feet in size. The machine shop is large, and thoroughly equipped with all modern machinery and appliances. The buildings are heated by steam and the mill is supplied throughout with fire pipes, hose and chemical engines, and is lighted by electricity, the electrical plant being situate on the premises. In addition to water supply from the Canal, it has a large artesian well of the best quality of water for domestic and steam purposes. The mill has full privileges and protection under the patents of the Columbia Wire Company.

The sale will be made for cash and without redemption, free of all mechanics liens or other liens of parties to the cause in which the Receiver is appointed.

Sealed bids for this property will be received by the undersigned, as such Receiver, up to Twelve o'clock Noon of April 8th, 1896. The bids will be turned over to the Court and will be opened in Court at One-thirty o'clock P. M. of said day and then made public. A certified check on some National Bank for Five Thousand Dollars ($5,000) payable to the order of the Receiver, must accompany each bid.

The Court expressly reserved the right to reject any and all bids.

An inspection of the mill may be had and any further information obtained by application to the undersigned, as such Receiver, at Joliet, Illinois. March 4th, 1896.

GEORGE H. MUNROE, Receiver.

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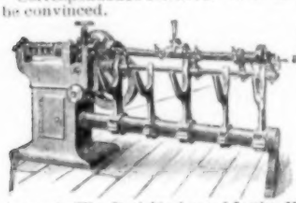

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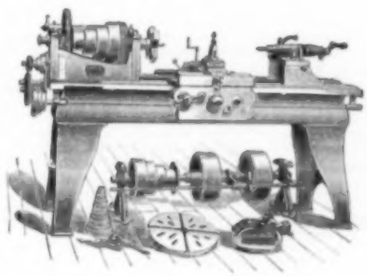

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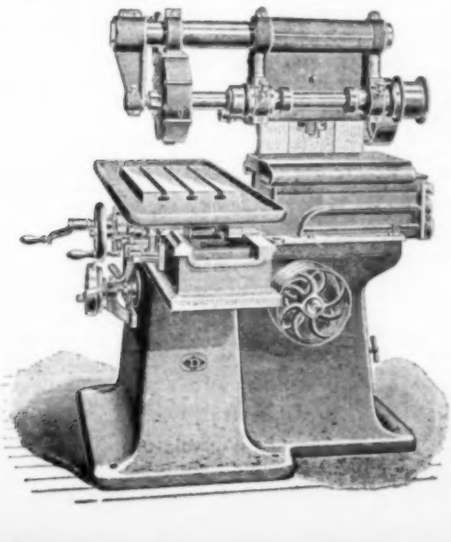

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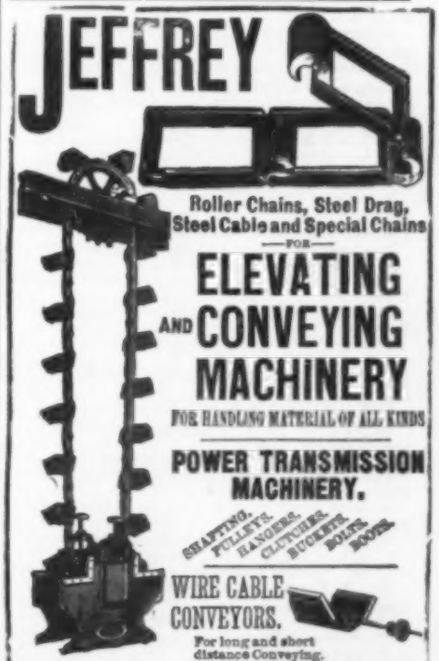

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Link-Belt Machinery Co. Chicago, Ill.

Lathes—
Prentiss Tool & Supply Co., Chicago, Ill.
Davis & Egan Machine Tool Co., Cincinnati, O.
Lodge & Shipley Machine Tool Co., Cincinnati
U. Baird Machinery Co., Pittsburg, Pa.
The Wright Co, Lowell, Mass.
Springfield Machine Tool Co., Springfield, O.

Machinists' Tools and Supplies—
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H. Bickford, Lakeport, N. H.
Davis & Egan Machine Tool Co., Cincinnati, O.
C. H. Besly & Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Diamond Machine Co., Providence, R. I.
U. Baird Machinery Co., Pittsburg, Pa.
The L. S. Starrett Co., Athol, Mass.
Skinner Chuck Co., New Britain, Conn.
Bertsch & Co., Cambridge City, Ind.
Lodge & Shipley Machine Tool Co., Cincinnati
C. H. Haeseler & Co., Philadelphia, Pa.
Springfield Machine Tool Co., Springfield, O.

Machine Screws—
Illinois Screw Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Machine Shops—
Toledo Machine & Tool Co., Toledo, O.
Hamilton Fdy. & Machine Co., Hamilton, O.
Springfield Machine Tool Co., Springfield, O.

Magnesia Covering—
C. H. Besly & Co., Chicago, Ill.

Manufacturers' Advertising—
United States Mailing Co., Cleveland, O.

Metal Bearings—
North American Metaline Co., Long Island City, N. Y.

Metallic Lath—
The Cincinnati Corrugating Co., Piqua, O.

Metal Saws—
Q. & C. Co., Chicago, Ill.

Milling Machines—
Prentiss Tool & Supply Co., Chicago, Ill.
Davis & Egan Machine Tool Co., Cincinnati, O.
Lodge & Shipley Machine Tool Co., Cincinnati.

Mining Machinery—
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Vulcan Iron Works Co., Toledo, O.
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.
Willis Shaw, 416 N. Y. Life Bldg., Chicago.
Link-Belt Machinery Co., Chicago, Ill.

Motors—
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Molding Sand—
Ohio Sand Co., Conneaut, O.

Nickel—
Canadian CopperCo., Cleveland, O.

Oilless Bearings—
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W. S. Rockwell & Co., New York City.

Oil Cups—
C. H. Besly & Co., Chicago, Ill.

Oil Pumps—
C. H. Besly & Co., Chicago, Ill.

Ore Crushers—
The Edward P. Allis Co., Milwaukee, Wis.
American Hoist & Derrick Co., St. Paul, Minn.

Packing—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

Paint—
Iron Clad Paint Co., Cleveland.
Jos. Dixon Crucible Co., Jersey City, N. J.
Standard Paint Co., New York City.

Pattern Leather Fillet—
Canton Leather Fillet Co., Canton, O.

Pattern Works—
Gobeille Pattern Co., Cleveland, O.

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Harrington & King Perforating Co., Chicago, Ill
Aitchison Perforated Metal Co., Chicago.

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Planers—
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Davis & Egan Machine Tool Co., Cincinnati, O.
Lodge & Shipley Machine Tool Co., Cincinnati.
U. Baird Machinery Co., Pittsburg, Pa.

Plates—
Pittsburg Steel & Iron Mfg. Co., Pittsburg, Pa.

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Bertsch & Co., Cambridge City, Ind.
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Link-Belt Machinery Co, Chicago, Ill.

Pulley Blocks—
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American Hoist & Derrick Co., St. Paul, Minn.
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Battle Creek Steam Pump Co., Battle Creek, Mich.
Deming Co., Salem, O.
The Edward P. Allis Co., Milwaukee, Wis.
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Edward Brown, Philadelphia, Pa.

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Retort Coke Ovens—
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Morton Tin Plate Co., Cambridge, O.
The Cincinnati Corrugating Co., Piqua, O.

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Ward & Nash, Chicago, Ill.

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Harrington & King Perforating Co., Chicago.

Scrap Iron & Steel—
Klein & Cohn, Cincinnati, O.

Screws—
Illinois Screw Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O

Second-Hand Machinery—
Prentiss Tool & Supply Co., Chicago, Ill.

Semi-Steel—
McDowell Steel Co., Chicago, Ill.

Shapers—
Springfield Machine Tool Co., Springfield, O.

Shafting—
Finished Steel Co., Youngstown, O.

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Long & Allstatter Co., Hamilton, O.

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Cleveland Rolling Mill Co., Cleveland.
Berger Bros., Philadelphia, Pa.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
The Cincinnati Corrugating Co., Piqua, O.

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American Smokeless Furnace Co., Cleveland, O.
Brightman Furnace Co., Cleveland, O.
Playford Stoker Co., Cleveland, O.

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Playford Stoker Co., Cleveland, O.

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Berlin Iron Bridge Co., East Berlin, Conn.

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Cleveland City Forge & Iron Co., Cleveland.
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Enterprise Boiler Co., Youngstown, O.
Wm. B. Scaife & Sons, Pittsburg, Pa.

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Universal Telephone Co., Indianapolis, Ind.

Time Detector—
Nanz & Co., New York.

Tinning Machinery—
The Lloyd-Booth Co., Youngstown, O.

Tin Plate—
Morton Tin Plate Co., Cambridge, O.
Atlanta Steel & Tin Plate Co., Atlanta, Ind.
Ætna-Standard Iron & Steel Co., Bridgeport, O
The Cincinnati Corrugating Co., Piqua, O.

Torches—
Dangler Stove & Mfg. Co., Cleveland, O.

Tool Steel—
Wm. Jessop & Sons, Ltd., New York, N. Y.
C. H. Besly & Co., Chicago, Ill.

Tube Welding—
S. Fix Sons, Cleveland.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

Ventilating Fans—
American Blower Co., Detroit, Mich.

Watchman's Time Detector—
Nanz & Co., New York.

Welding Compound—
Cornelius S. Mitchill, New York City.

Wheelbarrows—
Lansing Wheelbarrow Co., Lansing, Mich

Wire Nails—
Salem Wire Nail Co., Salem, O.

Wire Rope—
American Hoist & Derrick Co., St.
Roberts Steel Chain Belting Co., Pittsburg.

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Cady Mfg. Co., Cleveland, O.
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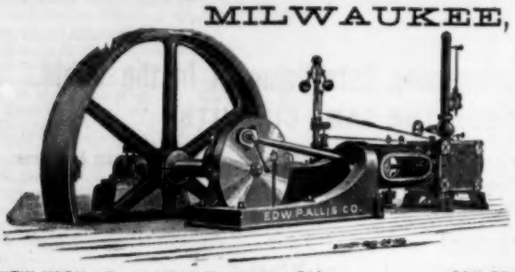

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4.50@ 5.00
No. 1 Bessemer hematite	3.75@ 4.25
Hematites No. 1 non-Bessemer	2.25@ 2.75
No 1. Specular, non-Bessemer	2.75@ 3.25

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$12 50@ 12 75
No. 1 Strong Foundry	12 00@ 13 25
No. 2 Strong Foundry	12 50@ 12 75
No. 1 Gray Forge, red short	11 25@ 11 50
No. 2 Gray Forge, neutral	10 75@ 11 00
No. 1 American Scotch	13 25@ 13 50
No. 2 American Scotch	12 75@ 13 00
Lake Superior Charcoal	13 50@ 14 25
PITTSBURG:	
No. 1 Foundry	$13 00@ 13 25
No. 2 Foundry	12 50@ 12 75
Gray Forge	11 00@ 11 25
White and Mottled	10 50@ 10 75
Warm Blast Charcoal	15 00@ 16 00
Cold Blast Charcoal	20 00@ 22 00
Bessemer	12 25@ 12 40
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 50@$14 00
Local Coke Foundry No. 1	12 50@ 13 00
Local Coke Foundry No. 2	12 00@ 12 50
Local Coke Foundry No. 3	11 00@ 12 00
Local Scotch Foundry No. 1	12 50@ 13 00
Local Scotch Foundry No. 2	12 00@ 12 50
Local Scotch Foundry No. 3	11 00@ 12 00
Southern Coke No. 1	11 85@ 12 35
Southern Coke No. 2	11 35@ 11 60
Southern Coke No. 3	10 35@ 11 35
Southern No. 1 Soft	11 35@ 11 60
Southern No. 2 Soft	10 [illegible]@ 11 35
Southern Silveries No. 1	11 85@ 12 35
Southern Silveries No. 2	11 60@ 11 85
Jackson Co. Silveries	14 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	16 85@ 17 35
Malleable Bessemer	@ 13 00
Coke Bessemer	13 00@ 14 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$11 00@$11 25
Southern Coke No. 2 and No. 1 Soft	10 25@ 10 50
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	13 50@ 14 00
Jackson County Silvery No 1	14 00@ 14 50
Southern Coke, Gray Forge	9 25@ 9 50
" " Mottled	9 00@ 9 25
Standard Alabama Car Wheel	15 75@ 16 25
Tennessee " "	14 50@ 15 00
Lake Superior " "	14 50@ 15 00
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$13 50
No. 2 Foundry Strong Coke Iron Lake Superior Ore	13 00
Ohio Strong Softener No. 1	13 70
Jackson Co. Silvery No. 1	15 25@ 15 75
Lake Superior Charcoal	14 00@ 14 50
Southern Soft No. 1	12 50
Hanging Rock Charcoal	18 00
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$ @$11 50
Southern Coke No. 2	11 00
Southern Coke No. 3	10 50
Southern Gray Forge	10 00
Southern Charcoal No. 1	15 00
Missouri Charcoal No. 1	14 00@ 15 00
Ohio Softeners	16 00
Lake Superior Car Wheel	15 00
Southern Car Wheel	16 25

OLD RAILS AND SCRAP METAL.

	GROSS TONS
Old iron rails	$16 25
Old steel rails	12 00
Old car wheels	13 00
	NET TONS
No. 1 R. R. wrought scrap	$12 75
Mill scrap	10 00
No. 1 Machine cast scrap	10 00
Iron axles	16 50
Axle turnings	9 00
Wrought turnings (free from cast)	8 00
Cast borings	7 00
Uncut wrought iron boilers	5 00
Steel boiler plates	10 00
Grate bars	6 50
Pipes and flues (clean)	8 50
Tank iron	9 00
Hoop and band iron	7 00
Sheet iron	6 50
Wrought drillings	7 50
Malleable Iron	9 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.49c@	1.54c
Angles	1.34c@	1.39c
Tees	1.49c	
Universal Plates	1.45c	
Sheared Plates	1.55c	

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 60
4½ to 6 by ⅜ to 1 inch	1 65
1¾ to 6 by 1¼ to 2 inch	1 65
1¼ & 1⅜ by ⅜ to ¾ inch	1 40
1 & 1⅛ by ⅜ to ¾ inch	1 50
⅛, ¼, ⅜, by ⅜ to ½ inch	1 60

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Used Dry, or Mixed with Water, Oil or Grease

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MACHINERY FOR HANDLING COAL AND ORE.

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No Steam, Coal, Ash, Gauges, Engineer nor Danger.

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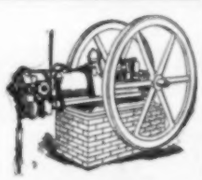
33d and Walnut Sts., PHILADELPHIA, PA.

S. M. York, 42 S. Water St., Cleveland Agent. Over 45,000 Sold.



IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND OHIO.

ORDER DIRECT FROM THE Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅞ inch	1 40
2 to 2⅜ inch	1 60
2¾ to 3¼ inch	1 55
3⅜ to 4 inch	1 90
4⅛ to 4⅝ inch	2 50
4¾ to 5 inch	2 70

Oval.

⅜ to 1¼ inch	1 60
⅜ to ¾ inch	1 60
½	1 80
⅝	2 00

Half Oval and Half Round.

1⅜ to 3 inch	1 95
⅞ to 1⅛ inch	1 75
⅜ to ¾ inch	2 00
½	2 15
⅝	3 25

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 50
1 to 1¾ by ¼ and 5-16 inch	1 55
¾ to ⅞ by ¼ and 5-16 inch	1 65
⅛ to ⅜ by ¼ and 5-16 inch	1 90

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 75
1 7-16 to 2, No. 17, 18 and 19	1 80
1 7-16 to 2, No. 20	1 90
1 7-16 to 2, No. 21	2 00
1 7-16 to 2, No. 22	2 10
1⅛ to 1⅜, No. 13, 14 and 15	1 80
1⅛ to 1⅜, No. 16, 17 and 18	1 85
1⅛ to 1⅜, No 19 and 20	1 90
1⅛ to 1⅜, No. 21	2 00
1⅛ to 1⅜, No. 22	2 10
15-16 and 1 inch, No. 13, 14 and 15	1 75
15-16 and 1 inch, No. 16, 17 and 18	1 90
15-16 and 1 inch, No. 19 and 20	2 00
15-16 and 1 inch, No. 21	2 10
15-16 and 1 inch, No. 22	2 20
⅞, No. 13, 14 and 15	2 00
⅞, No. 16, 17 and 18	2 10
⅞, No. 19 and 20	2 20
⅞, No. 21	2 30
⅞, No. 22	2 40
13-16, No. 13, 14 and 15	2 10
13-16, No. 16, 17 and 18	2 20
13-16, No. 19 and 20	2 30
13-16, No. 21	2 40
13-16, No. 22	2 50
¾, No. 13, 14 and 15	2 20
¾, No. 16, 17 and 18	2 35
¾, No. 19 and 20	2 45
¾, No. 21	2 55
¾, No. 22	2 65
11-16, No. 13, 14 and 15	3 45
11-16, No. 16, 17 and 18	3 50
11-16, No. 19 and 20	2 60
11-16, No. 21	2 70
11-16, No. 22	2 80
11-16, No. 23	2 90
⅝, No. 13, and 15	2 50
⅝, No. 16, 17 and 18	2 60
⅝, No. 19 and 20	2 70
⅝, No. 21	2 80
⅝, No. 22	2 90
⅝, No. 23	3 00
9-16, No. 13, 14 and 15	2 70
9-16, No. 16, 17 and 18	2 80
9-16, No. and 20	3 90
9-16, No. and	2 00
9-16, No. 221	3 10
9-16, No. 22	2 20
7-16 ad ½ inch, No. 13, 14 and 15	3 90
7-16 and ½ inch, No. 16, 17 and 18	3 00
7-16 and ½ inch, No. 19 and 20	3 10
7-16 and ½ inch, No. 21	3 20
7-16 and ½ inch, No. 22	3 30
7-16 and ½ inch, No. 23	3 40
½, No. 13, 14 and 15	3 40
½, No. 16, 17 and 18	3 50
½, No. 19 and 20	3 60
½, No. 21	4 90
½, No. 22	4 00
½, No. 23	4 15

Light Band.

1⅜ to 6 by ⅛ to 3-16 inch	1 60
1¾ to 6 by Nos. 11 and 13	1 65
1 to 1⅜ by ⅛ to 3-16 inch	1 65
1 to 1⅜ by Nos. 11 and 13	1 70
⅝ and 13-16 by ⅛ to 3-16 inch	1 80
⅝ and 13-16 by Nos. 11 and 13	1 75
⅝ and 11-16 by ⅛ to 3-16 inch	1 90
⅝ and 11-16 by Nos. 11 and 13	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 13	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 13	2 25

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 13	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 13	1 95
¾ inch, " " " " 13 and 14	1 35

Sheet Iron.

No. 10	1 60
No. 12	1 70
No. 14	1 80
No. 15-17	1 90
No. 18	2 05
No. 20	2 20
No. 22-24	2 30
No. 25-26	2 40
No 27	2 50

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 45
Shell	1 60
Flange	1 70
Marine Flange	2 00
Fire Box	2 50

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	18
9-16 to ⅞ in. "	18

ÆTNA-STANDARD IRON AND STEEL COMPANY,

BRIDGEPORT, OHIO,

MANUFACTURERS OF

TIN AND TERNE PLATE, Iron and Steel Plates and Sheets, Plain Black, Painted, Corrugated and other forms of ROOFING, SIDING and CEILING. Patent Leveled Galvanized Sheets, BARS, Light Section Rails, ANGLES, Tees, Channels, and other Miscellaneous Bars and SHAPES.

WITH SUCH DIVERSITY OF PRODUCT,

SPECIAL ADVANTAGES are offered buyers of mixed lots, effecting saving in freight charges and by reason of our LARGE STOCKS, securing **PROMPT SHIPMENT.**

INQUIRIES INVITED AND CATALOGUES MAILED ON APPLICATION.

ROBERTS STEEL CHAIN BELTING CO., Pittsburg, Pa.

Elevating and Conveying Machinery

For Handling all kinds of materials.

Special Wrought and Steel Chains of every description; Coil and Cable Chains; Chain Haulages for Coal Mines; Sprocket Wheels; Complete Coal and Ashes Handling Plants; Wire Rope Haulages and Wire Rope.

W. H. COFFMAN COKE CO.

BLUEFIELD, W. VA.

GENERAL FACTORS AND SHIPPERS OF

POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00.677
Fixed Carbon	93.625	Ash	05.004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

STEEL CASTINGS

FROM 10 LBS. UPWARD.

Made from Best Open-Hearth Steel.

ALSO SAND ROLLS AND CAST-IRON PINIONS.

SEND FOR ESTIMATES.

THE JOHNSON COMPANY, Johnstown, Pa.

COMBINE SAFETY WATER TUBE BOILER
L. M. MOYES, MANUFACTURER, PHILADELPHIA, PA.

GARDEN CITY FOUNDRY CO.

INCORPORATED.

Successors to TURNER, DICKINSON & CO.

Armitage and Central Avenues, Station G, Chicago, Ill.

FRICTION CLUTCHES, HANGERS, PILLOW BLOCKS & PULLEYS.

Large Stocks on Hand. Shipments Promptly Made.

Subscribe for the Iron Trade Review, $3 per year.

7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅜ to 11-16 and 4⅛	.10
⅛ to 6 in.	.10½
⅛ to 9-32 and 6⅛ to 7 in.	.11
7 in	.13

Flats.

	cts. ₶s
2 to 9-16 in. wide by 2 to ⅜ thick	.8

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 80
Open-hearth Spring	"	2 20
Sleigh Shoe	"	1 90
Toe Calk	"	2 10
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base		dis. 65
Butt " " "		dis.
Lap " galv. "		dis. 52½
Butt " " "		dis. 50
Boiler tubes 2¼" and smaller		dis 62½
Boiler tubes 2½" and larger		dis. 65
Casing screw and socket joint		dis. 52½
Casing inserted joint		dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	₶ lb 9@10
Wright's	₶ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis
" " Gear Cutters	dis

Crowbars.

Cast Steel	₶ lb 3½
Iron, steel points	₶ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

SHIFFLER BRIDGE COMPANY,

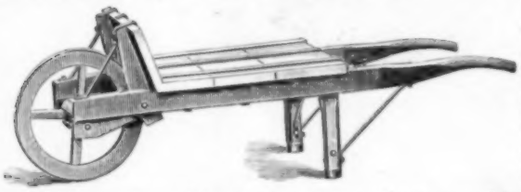
BUILDING DEPARTMENT.

SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING-MILLS TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

Main Office and Works:
48th Street and A. V. Ry.
PITTSBURG, PA.

Branch Offices:
1123 Betz Building, Philadelphia, Pa.
65 Dexter Building, Chicago, Ill.
228 Lumber Exchange, Minneapolis, Minn.

Lansing Hand-Made Pig Iron Barrow.



Made for carrying pig iron castings, etc. Sizes of bottom 3 ft. long by 2 ft. wide, 8½ in high in front, bottom 1¼ in thick. We iron the bottom of this barrow with strips of ¼-in. iron, which we bolt to the bottom and handles. All irons are bolted and nothing but first-class timber used in these wheelbarrows. Handles made of 2x3 in. white oak or hickory. Wheel very heavy, diameter 19 in., tread 1¾ in., tire ¼ in. thick. Iron bands on ends of legs. This is a wheelbarrow that will stand work. Weight of barrow, 90 lbs. Telegraph name, Seaboard. Write for prices of steel barrows, trucks, etc., to (4)

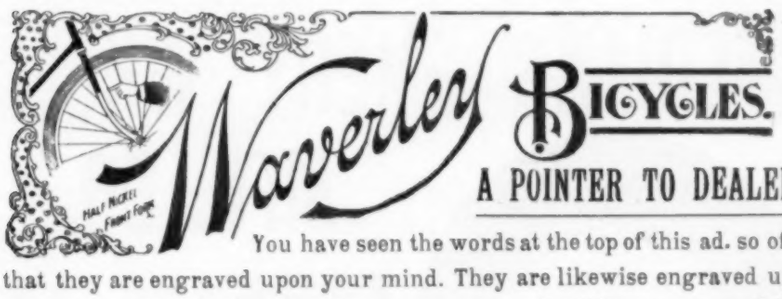
Lansing Wheelbarrow Co., Lansing, Mich.

STUART FIRE BRICK CO.

MANUFACTURERS OF
Silica Brick
For Open-Hearth, Basic and Acid Steel Furnaces, Glass and Copper Tank Furnaces. Extra Shapes MADE TO ORDER.
Office, Room 21, Conestoga Bldg., Cor. Wood and Water Sts., PITTSBURG, PA.

The Iron Trade Review

Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**



A POINTER TO DEALERS.

You have seen the words at the top of this ad. so often that they are engraved upon your mind. They are likewise engraved upon the mind of almost every individual who can read. When a person thinks of bicycles the first thing that flashes upon the mind is and that is the first wheel asked for. Do you realize the importance of being able to supply what a prospective buyer wants? Just consider it for a few moments, and then write us for terms.

Waverley

INDIANA BICYCLE CO., **INDIANAPOLIS, IND.**
EASTERN DISTRIBUTING BRANCH.
339 BROADWAY, NEW YORK.

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F. F.	FF.
Kegs, ℔	4½c	5 c	2¾c	
½ kegs ℔	4¾c	5¼c	2¾c	
¼ kegs ℔	5 c	5¼c	3 c	
10 ℔ cans, 10 in case	6 c	6¼c	5 c	
10 ℔ cans less than 10	10 c	10 c	7½c	

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 50@50&5
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 60@70
Norton's.....dis 60@70
Grant.....dis 60@70
Sterling.....dis 60@70
Celluloid.....dis 10&33⅓
Northampton.....dis 50
Crystal.....dis 65@70
Vitrified.....dis 60@70
Vulcanite.....dis 60&10
Hamden.....dis 60&10@75
Cyclone.....dis 60@60&10

Files.

Arcade.....dis 60&10@60&10&10
Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 60&10@60&10&10
Disston's.....dis 60@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....12c
" " " " over 5 lbs.....10c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅜	11⅜	8½	6	3½	5¼	
Washers	9	8	7	5	4½	4½	4⅛

In lots less than 100 lbs, ℔ ℔ add ½c., 1 ℔ boxes add 1c to list.

Nails (wire).

List July 14, 1887.....dis 85
Standard Penny Nails, ℔ keg card rate
Car lots.....$2.75
Less than car lots.....$2.35

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ℔ doz.....dis 10@10&10

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 50
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block.....dis 20

Rivets.

Iron, Thousand, list November 1, 1894.....dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894.....dis 60@65
Copper.....dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Apr. 9, 1894

Brass.....dis 40
Copper.....dis 40
Bright and annealed, Nos. 0@18.....dis 70&10@75
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65& 5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 73
Stub's Steel Wire regular.....95c ℔ lb dis 30

Wrenches.

Coe's genuine.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanic's.....dis 55&10& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 65
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Iligator " " .....dis 40

TO CALIFORNIA

IN PULLMAN TOURIST SLEEPING CARS.

The Burlington Route (C. B. & Q. R. R.) runs personally conducted excursions to California, leaving Chicago every Wednesday. Through cars to California destination, fitted with carpets, upholstered seats, bedding, toilet rooms, etc.; every convenience. Special agent in charge. Route via Denver & Salt Lake. Sunshine all the way. Write for descriptive pamphlet to T. A. Grady, Excursion Manager, 211 Clark St., Chicago.

ARE YOU LOOKING

FOR A CHANGE IN LOCATION?

If you are not satisfied with your present site, or if you are not doing quite as well as you would like to, why not consider the advantages of a location on the Illinois Central R. R. or the Yazoo & Mississippi Valley R. R.? These roads run through South Dakota, Minnesota, Iowa, Wisconsin, Illinois, Indiana, Kentucky, Tennessee Mississippi and Lousiana, and possess

FINE SITES FOR NEW MILLS,
BEST OF FREIGHT FACILITIES,
CLOSE PROXIMITY TO
COAL FIELDS AND DISTRIBUTING CENTERS
AND
INTELLIGENT HELP OF ALL KINDS,
MANY KINDS OF RAW MATERIAL.

For full information, write the undersigned for a copy of the pamphlet entitled

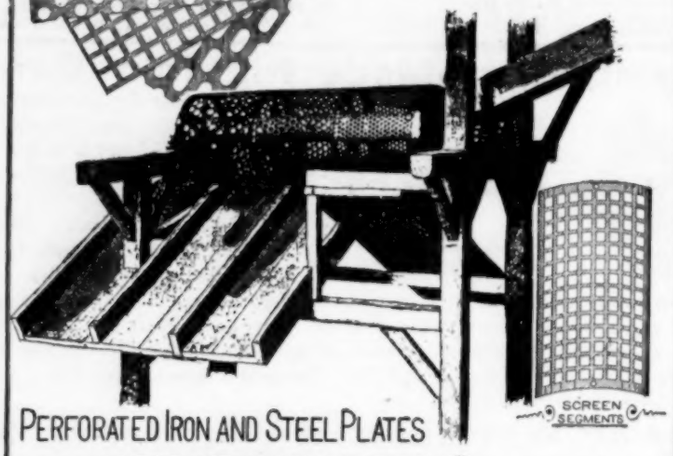
100 Cities and Towns WANTING INDUSTRIES

This will give you the population, city and county debt, death rate, assessed valuation of property, tax rate, annual shipments, raw materials, industries desired, etc.

To sound industries, which will bear investigation, substantial inducements will be given by many of the places on the lines of the Illinois Central R. R., which is the only road under one management running through from the North-Western States to the Gulf of Mexico. GEO. C. POWER, Industrial Commissioner I. C. R. R. Co., 506 Central Station, Chicago. 1-2-'94

THE HARRINGTON AND KING PERFORATING CO.

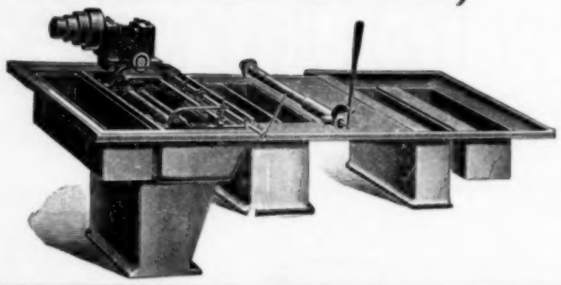
CHICAGO, ILL.



PERFORATED IRON AND STEEL PLATES
FOR SCREENING AND SIZING
COAL, COKE, ORE, STONE &C.
BRONZE PLATES TO WITHSTAND
THE ACTION OF MINE WATERS.
PLATES FURNISHED FLAT, OR ROLLED TO CYLINDRICAL
FORM FOR REVOLVING SCREENS.
PERFORATIONS IN ROUND, SQUARE, OR OBLONG HOLES.
WE DO NOT FURNISH SCREENS COMPLETE ONLY PERFORATED SCREEN PLATES.

THE LLOYD-BOOTH CO., YOUNGSTOWN, OHIO.

Tinning MACHINERY.



Rolling Mills, Sand and Chill ROLLS.

STERLING EMERY WHEEL MFG. CO.

TIFFIN, O.

CORRESPONDENCE SOLICITED.

AGENTS:
McIntosh, Huntington Co., Cleveland.
Somers, Fitler & Clarke, Pittsburg.
McDowell, Stocker & Co., Chicago

Subscribe for THE IRON TRADE REVIEW, $3.00 per year.

P. & B. Ruberoid Roofing is peculiarly adapted for Buildings of any character which are exposed to Acids, Alkalies, Coal Gas, etc. Thoroughly effective strong, and very durable.

We Invite Correspondence on the Subject.

THE STANDARD PAINT CO.,

SOLE MANUFACTURERS.

3 Liberty Street, . . NEW YORK.

Chicago Office, 186 5th Avenue.
Cleveland, Ohio, - The A. T. Osborn Co.

PYROMETERS

Edward Brown,

ESTABLISHED 1860.

311 WALNUT St., PHILADELPHIA.
Manufacturer and Patentee
OF THE

Hot Blast (or Graphite) Pyrometer.—The only stationary Pyrometer now in use durable over 700 degrees.

The Standard Portable Pyrometer—For Blast Furnaces.

Mercury Revolution Indicator.—Centennial Exhibition Medal. Accurate for all time.

Annealing Oven Pyrometer—to 3,000 degrees—of 1893.

Tin-plating Pyrometer—of 1894.

Mercury and Steam Gauges.

STEAM ENGINEERING

(Stationary, Marine and Locomotive), Electricity, Architectural and Mechanical Drawing, Plumbing, Heating, Mining, English Branches, etc.,

TAUGHT BY MAIL.

Engineers can qualify to obtain licenses. To enroll only necessary to know how to read & write. Circular **free.** State subject you wish to study.

The International Correspondence Schools, SCRANTON, PA.

MINING HOISTS

—AND—

HOISTING ENGINES.

DERRICKS

American Hoist & Derrick Co.,
ST PAUL, MINN.

Chicago, 60 So. Canal St.
New York, Havemeyer Bldg
Cincinnati, Carew Bldg.

THE BETHLEHEM IRON CO.,

Principal Office and Works

SOUTH BETHLEHEM, PA.

STEEL RAILS.

BILLETS AND MUCK BAR,

STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.

Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

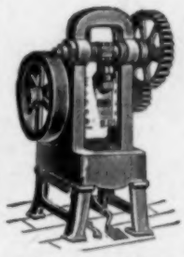
NEW YORK OFFICE, 100 BROADWAY. PHILADELPHIA OFFICE, 421 CHESTNUT ST.

CHICAGO OFFICE, MARQUETTE BUILDING.

THE TOLEDO MACHINE & TOOL CO.

501-505 Superior St., Toledo, Ohio.

We manufacture



No. 54 Power Press.

Power Punches, Forging Presses,
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Straight Sided Double Pitman Presses,
Drop Presses,
Embossing Presses, Automatic Feed Presses,
Stamping Presses, Power Slitting Machines,
Riveting Machines, Power Shears.

Special and Automatic Machinery Dies for all classes of work in sheet metals.
Write for catalogue and prices.

No. 75 Power Press.

THE "CLEARFIELD" FIRE BRICK

MANUFACTURED BY

THE CLEARFIELD FIRE BRICK CO., Limited,

Office and Works at CLEARFIELD, PA.

929 Liberty Street, Pittsburg, Pa., John Richardson, Agent.

CLEVELAND ROLLING MILL CO.,

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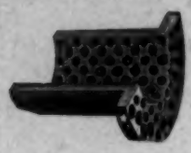

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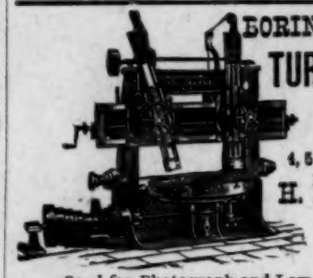

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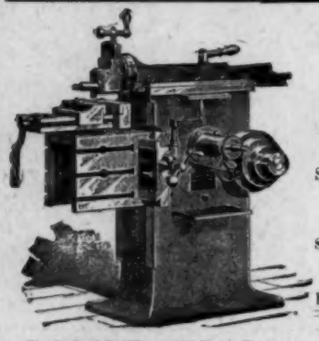

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